ENERGY TRANSFER

800 E. Sonterra Blvd.
San Antonio, Texas 78258-3941
210-403-7300
210-403-7500 (Fax)

May 22, 2019

via Federal Express

Mr. Timothy Franquist, Director
Arizona Department of Environmental Quality
Air Quality Division
1110 West Washington
Phoenix, AZ 85007

Subject: Title V Permit Renewal Application
Air Quality Control Permit No. 59729, Place ID: 2169
Transwestern Pipeline Company, LLC
Flagstaff Compressor Station

Dear Mr. Franquist:

Transwestern Pipeline Company, LLC (Transwestern) is submitting to the Arizona Department of Environment Quality (ADEQ) the enclosed application to renew the Class I, Title V operating permit for Flagstaff Compressor Station (Station No. 2) located in Coconino County, Arizona. The current operating permit for this facility is Air Quality Control Permit No. 59729.

Enclosed are one copy of the permit application and one compact disk containing both a file of the complete application and a spreadsheet file containing the calculations of the potential emissions from the facility and a summary of total facility emissions. Transwestern is also submitting a hard copy of the application to U.S. Environmental Protection Agency Region 9. Transwestern intends for this submittal to fulfill the requirement to submit a complete, timely permit application that satisfies the renewal submittal timing requirements stipulated in A.A.C.R18-2-304.C.2.

Please note that since the last renewal of the station's operating permit, the only physical changes to Flagstaff Compressor Station have been the replacement of the turbine with a like-for-like unit and the replacement of one of the Caterpillar G3508 generator engines with a like-for-like engine. There have been no changes to applicable requirements due to these like-for-like exchanges. In addition, with this application, Transwestern is adding a second oily wastewater tank to the source list. This tank is an existing tank, but is an insignificant source that has not been actively used in recent years. Transwestern requests that this tank be added to the permit representation as an insignificant source. There are no applicable requirements for this tank.

If you have any questions or need additional information or copies of the enclosed application materials, please contact me at 210-572-0504 or via e-mail at karl.huston@energytransfer.com. In addition, if you have technical questions about the facility or its emissions, you may also contact Mr. Larry Campbell of Transwestern at 575-625-8022 or via e-mail at larry.campbell@energytransfer.com. Thank you for your consideration of this application.

Sincerely,

Karl Huston

Karl Huston
Environmental Permit Specialist

cc: U.S. EPA Region 9, San Francisco, California

Enclosures

ENERGY TRANSFER

Application for Title V Permit Renewal for Air Quality Control Permit No. 59729

Submitted for:

Flagstaff Compressor Station
(Place ID: 2169)
Coconino County

By:

Transwestern Pipeline Company, LLC

May 2019

Table of Contents

SECTION 1 – Introduction and Narrative Information

Introduction and Narrative Information

This section provides an introduction and narrative description of the content of this permit application. An introduction is presented to identify the site and its current operating permit, and narrative information is provided on the operation of the site and its emissions sources and to present an overview of the information included throughout the remainder of the application.

Introduction

Transwestern Pipeline Company, LLC (Transwestern) operates Flagstaff Compressor Station, which is a natural gas compressor station (Standard Industrial Classification code 4922) located in Coconino County approximately 3 miles west of Flagstaff, Arizona. Coconino County is designated as an attainment area for all criteria pollutants. The facility, which is designated as Place ID 2169, is currently operating under Arizona Department of Environmental Quality (ADEQ) Class I Title V Permit No. 59729, issued on November 25, 2014.

This application package is submitted as an application to renew Permit No. 59729 for Flagstaff Compressor Station. Application forms, including the Standard Permit Application Form, Emissions Sources and Equipment List forms, and an Application Administrative Completeness Checklist, are included in Section 2.0. The content of the remainder of the application is discussed in the following section.

Narrative Information

This section provides a narrative discussion of the information presented in this application to supplement the information contained in the application forms included in Section 2.0. Information pertinent to the operation of Flagstaff Compressor Station and its emissions sources is presented. This section also outlines the information contained in the remaining sections of this permit application and discusses the compliance status of the station.

Since the last renewal of the station's operating permit, the station's turbine and one of the Caterpillar G3508 generator engines were replaced with like-for-like units. These exchanges did not change the station's potential to emit or the applicable requirements for these emission sources.

With this application, Transwestern is adding a second oily wastewater tank to the equipment list in Section 2.3 of the application forms. This tank is an existing tank, but is an insignificant source due to the negligible vapor pressure of product stored in the tank. This tank has not been actively used in recent years, but Transwestern requests that this tank be added to the permit representation as an insignificant source. There are no applicable requirements for this tank.

Process Description and Process Flow Diagram

A process description for Flagstaff Compressor Station is presented in Section 3.0 and a process flow diagram is included in Section 4.0.

Compressor Station Location Maps and Plot Plans

Area maps showing the location of Flagstaff Compressor Station and plot plans, including an aerial photo of the station, are presented in Section 5.0.

Maximum Process Rates

The station has the nominal capacity to move 1.21 billion cubic feet per day of natural gas through the pipeline. This rate is approximately 50.4 million cubic feet per hour, which is an estimate because capacity is variable, depending on the load on the turbine and the compression provided by stations upstream. It is likely that at times the station will exceed this transmission rate. This capacity is provided for information only and should not be included in the final permit as an operating limitation.

Fuel-Burning Equipment

The fuel-burning process equipment (turbine and electric-power generators) at the station combusts natural gas as fuel. The compressor turbine burns natural gas fuel at a maximum rate of 352.24 million British thermal units (MMBtu) per hour. The higher heating value of the fuel is estimated to be 1,050 Btu per cubic foot.

Operating Schedule

The turbine and compressor operate 24 hours per day every day of the year. One of the two electric power generators operates 24 hours per day throughout the year to provide power for the compressor station. Operation is divided between the generators so that each operates nominally for half of the year. The generator engines never operate concurrently except during maintenance or testing of one of the generators, up to a maximum of 240 hours per year.

Emissions Calculations

Estimates of potential annual and hourly emissions are presented in Section 6.0. These emissions calculations include estimates of emissions of both criteria pollutants and greenhouse gases. Supplemental information used in the calculations of emissions, including emission factors contained in U.S. Environmental Protection Agency AP-42, is presented in Section 7.0.

Alternate Operating Scenarios

Transwestern Pipeline Company is neither proposing nor requesting an alternate operating scenario with this application.

Compliance Assurance Monitoring Applicability Analysis

Compliance assurance monitoring (CAM) requirements apply to an emissions unit at a major source provided that all three of the following criteria are met by the unit:

- The emissions unit is subject to an emission limitation or standard for an air pollutant (or surrogate thereof) in an applicable requirement.
- The emission unit uses a control device to achieve compliance with the emission limitation or standard.
- The emission unit has a pre-control device potential to emit of greater than or equal to the quantity (in tons per year) required for a site to be classified as a major source.

None of the emissions sources at Flagstaff Compressor Station has a control device; thus, the second criterion above is not met for any source. Therefore, CAM is not applicable to any of the emissions units at the station.

Proposed Exemptions from Requirements

Transwestern Pipeline Company is not proposing an exemption from otherwise applicable requirements. Applicable requirements are discussed below and in Section 8.0.

Applicable Requirements and Compliance Status

Applicable requirements and the station's compliance status with these requirements are presented in a regulatory applicability and compliance demonstration table included in Section 8.0. This table identifies applicable requirements for the station and shows the station's compliance status with applicable state requirements from Arizona Administrative Code Chapter Title 18, Chapter 2, Articles 6, 7, 8, 9 and 11, and with applicable federal requirements. As of the submittal date of this application, the station is in compliance with all requirements.

As noted in the table of applicable requirements, Transwestern is requesting a permit shield from 40 Code of Federal Regulations (CFR) Part 60, Subparts OOOO and OOOOa, which potentially applies to storage tanks installed after August 23, 2011, and September 18, 2015, respectively. Since the station's condensate tank (ID No. TK-COND1) and mist extractor (ID No. TK-COND2), which are the only potentially affected sources at the station, were installed well before August 2011, the tank and mist extractor are exempt from the requirements of these regulations.

Section 8.0 also discusses the remote status of the station's two generator engines, which are subject to requirements of 40 CFR Part 63, Subpart ZZZZ. The section presents a demonstration that these engines meet the definition of remote that is contained in this regulation.

SECTION 2 – Application Forms

Application Forms

This section presents the forms submitted for the application to renew Title V Permit No. 59729. These forms are taken from Sections 2.1, 2.2, 2.3, and 4.0 of the ADEQ "Application Packet for a Class I Permit," dated February 23, 2018 and include the following:

- Section 2.1 – Standard Class I Permit Application Form
- Section 2.2 – Emission Sources
- Section 2.3 – Equipment List
- Section 4.0 – Application Administrative Completeness Checklist

Please note that the certification of this application by the station's responsible official is included on the Standard Class I Permit Application Form of Section 2.1.

SECTION 2.1

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Air Quality Division

1110 West Washington • Phoenix, AZ 85007 • Phone: (602) 771-2338

STANDARD CLASS I PERMIT APPLICATION FORM

(As required by A.R.S. § 49-426, and Chapter 2, Article 3, Arizona Administrative Code)

1. Permit to be issued to (Business license name of organization that is to receive permit):
   Transwestern Pipeline Company, LLC

2. Mailing Address: 6381 N. Main Street
   City: Roswell State: New Mexico ZIP: 88201

3. Name (or names) of Owners/ Principals: Transwestern Pipeline Company, LLC
   Phone: 575-625-8022 Fax: 575-627-8172

4. Name of Owner's Agent: Larry Campbell
   Phone: 575-625-8022 Fax: 575-627-8172 Email: larry.campbell@energytransfer.com

5. Plant/Site Manager/ Contact Person and Title: Chris Gaston, Manager of Operations
   Phone: 970-259-8238 Fax: 928-774-1669 Email: chris.gaston@energytransfer.com

6. Plant Site Name: Flagstaff Compressor Station

7. Plant Site Location Address: 10 miles west of Flagstaff, just north of I-40
   City: Flagstaff County: Coconino Zip Code: 86002
   Indian Reservation (if applicable, which one): Not applicable
   Latitude/ Longitude, Elevation: 35° 17' 15" North latitude / 111° 52' 12" West longitude; 7,470 feet elevation
   Section/ Township/ Range: S17 T21N R10W

8. General Nature of Business: Natural Gas Transmission

9. Type of Organization:
   [X] Corporation [ ] Individual Owner [ ] Partnership [ ] Government Entity (Government Facility Code: ----------)
   [ ] Other _____

8. Permit Application Basis: [ ] New Source [ ] Revision [X] Renewal of Existing Permit
   (Check all that apply.)
   For renewal or modification, include existing permit number (and exp. date): Permit No. 59729; expires 11/25/2019
   Date of Commencement of Construction or Modification: Existing Source
   Primary Standard Industrial Classification Code: 4922

9. I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by ADEQ as public record. I also attest that I am in compliance with the applicable requirements of the Permit and will continue to comply with such requirements and any future requirements that become effective during the life of the Permit. I will present a certification of compliance to ADEQ no less than annually and more frequently if specified by ADEQ. I further state that I will assume responsibility for the construction, modification,

or operation of the source in accordance with Arizona Administrative Code, Title 18, Chapter 2 and any permit issued thereof.

Signature of Responsible Official: Dave Roybal

Official Title of Signer: Director of Operations

Typed or Printed Name of Signer: Dave Roybal

Date: 5-13-19 Telephone Number: 575-347-6514

or operation of the source in accordance with Arizona Administrative Code, Title 18, Chapter 2 and any permit issued thereof.

Signature of Responsible Official: _____

Official Title of Signer: Director of Operations

Typed or Printed Name of Signer: Dave Roybal

Date: _____ Telephone Number: 575-347-6514

SECTION 2.2 - EMISSION SOURCES

DATE May 2019

Estimated "Potential to Emit" per A.A.C. R18-2-101.
Review of applications and issuance of permits will be expedited by supplying all necessary information on this Table.

REGULATED AIR POLLUTANT DATA					EMISSION POINT DISCHARGE PARAMETERS										
EMISSION POINT [1]		CHEMICAL COMPOSITION OF TOTAL STREAM	AIR POLLUTANT EMISSION RATE		UTM COORDINATES OF EMISSION POINT [5]			STACK SOURCES [6]					NONPOINT	
NUMBER	NAME	REGULATED AIR POLLUTANT NAME [2]	#/ HR. [3]	TONS/ YEAR [4]	ZONE	EAST (Mtrs)	NORTH (Mtrs)	HEIGHT ABOVE GROUND (feet)	HEIGHT ABOVE STRUC. (feet)	EXIT DATA			SOURCES [7]		
										DIA (ft.)	VEL. (fps)	TEMP. (°F)	LENGTH (ft.)	WIDTH (ft.)	
204	Turbine	Oxides of Nitrogen	29.10	116.96	12	421146	3905162	55.25	20	8.5	30	1560	N/A	N/A	
		Carbon Monoxide	17.71	71.12											
		VOC	0.62	2.44											
		PM/PM10/PM2.5	2.67	6.41											
		Sulfur Dioxide	1.38	3.30											

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 7,470 feet
ADEQ STANDARD CONDITIONS ARE 293K AND 101.3 KILOPASCALS (A.A.C. R18-2-101)

General Instructions:

1. Identify each emission point with a unique number for this plant site, consistent with emission point identification used on plot plan, previous permits, and Emissions Inventory Questionnaire. Include fugitive emissions. Limit emission point number to eight (8) character spaces. For each emission point use as many lines as necessary to list regulated air pollutant data. Typical emission point names are: heater, vent, boiler, tank, reactor, separator, baghouse, fugitive, etc. Abbreviations are O.K.

2. Components to be listed include regulated air pollutants as defined in A.A.C. R18-2-101. Examples of typical component names are: Carbon Monoxide (CO), Nitrogen Oxides (NO_X), Sulfur Dioxide (SO_2), Volatile Organic Compounds (VOC), particulate matter (PM), particulate less than 10 microns (PM_{10}), etc. Abbreviations are O.K.
3. Pounds per hour (#/HR) is maximum potential emission rate expected by applicant.

4. Tons per year is annual maximum potential emission expected by applicant, which takes into account process operating schedule.

5. As a minimum applicant shall furnish a facility plot plan as described in the filing instructions. UTM coordinates are required only if the source is a major source or is required to perform refined modeling for the purposes of demonstrating compliance with ambient air quality guidelines.

6. Supply additional information as follows if appropriate:
   (a) Stack exit configuration other than a round vertical stack. Show length and width for a rectangular stack. Indicate if horizontal discharge with a note.
   (b) Stack's height above supporting or adjacent structures if structure is within 3 "stack height above the ground" of stack.

7. Dimensions of nonpoint sources as defined in A.A.C. R18-2-101.

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										DIA (ft.)	VEL. (fps)	TEMP. (°F)	LENGTH (ft.)	WIDTH (ft.)	
223	Generator Engine	Oxides of Nitrogen	24.90	112.05	12	421102	3905199	25.0	10	0.83	72.6	943	N/A	N/A	
		Carbon Monoxide	1.76	7.92											
		VOC	0.21	0.95											
		PM/PM10/PM2.5	0.084	0.38											
		Sulfur Dioxide	0.0026	0.01											

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										DIA (ft.)	VEL. (fps)	TEMP. (°F)	LENGTH (ft.)	WIDTH (ft.)
TK-COND1	Condensate Tank	VOC	15.83	0.70	12	421162	3905127	18	0	N/A	N/A	N/A	N/A	N/A
TK-COND2	Mist Extractor	VOC	15.63	0.11	12	421225	3905120	16	0	N/A	N/A	N/A	N/A	N/A
TK-MIN	Mineral Oil Tank	VOC	0.0	0.0	12	421115	3905196	8	0	N/A	N/A	N/A	N/A	N/A
TK-OW1	Oily Wastewater Tank	VOC	0.0	0.0	12	421111	3905196	12	0	N/A	N/A	N/A	N/A	N/A
TK-OW2	Oily Wastewater Tank	VOC	0.0	0.0	12	421177	3905314	18	0	N/A	N/A	N/A	N/A	N/A
LOAD	Condensate Loading	VOC	21.72	0.02	12	421208	3905075	N/A	0	N/A	N/A	N/A	N/A	N/A
FUG	Piping Fugitives	VOC	0.54	2.37	12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TK-COND2	Tank Flash	VOC	1.07	4.70	12	421225	3905120	16	0	N/A	N/A	N/A	N/A	N/A

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SECTION 2.3 - EQUIPMENT LIST

The following table should include all equipment utilized at the facility, and should be completed with all the requested information. Be sure to notate the units (tons/hour, horsepower, etc.) when recording the Maximum Rated Capacity information, the Serial Number and/or the Equipment ID Number. The date of manufacture must be included in order to determine if portions of the facility are NSPS applicable. Make additional copies of this form if necessary.

Type of Equipment	Maximum Rated Capacity	Make	Model	Serial Number	Date of Manufacture	Equipment ID Number
Turbine	30,565 hp	General Elecric	LM2500	642-145	2001	204
Generator	526 hp	Caterpillar	G3508	2JF00231	2001	223
Generator	526 hp	Caterpillar	G3508	CTN00154	2001	224
Condensate Tank	550 barrels	Not Applicable	Not Applicable	Not Applicable	1968	TK-COND1
Mist Extractor	30 barrels	Not Applicable	Not Applicable	Not Applicable	1984	TK-COND2
Mineral Oil Tank	30 barrels	Not Applicable	Not Applicable	Not Applicable	1968	TK-MIN
Oily Wastewater Tank	100 barrels	Not Applicable	Not Applicable	Not Applicable	2002	TK-OW1
Oily Wastewater Tank	550 barrels	Not Applicable	Not Applicable	Not Applicable	2002	TK-OW2
Condensate Loading	8,400 barrels	Not Applicable	Not Applicable	Not Applicable	~1984	LOAD
Piping Fugitives	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Available	FUG

SECTION 4.0 - APPLICATION ADMINISTRATIVE COMPLETENESS CHECKLIST

	REQUIREMENT	MEETS REQUIREMENTS			COMMENT
		YES	NO	N/A	
1	Has the standard application form been completed?	X			
2	Has the responsible official signed the standard application form?	X			
3	Has a process description been provided?	X			
4	Are the facility's emissions documented with all appropriate supporting information?	X			
5	Is the facility subject to Minor NSR requirements? If the answer is "YES", answer 6a, 6b and 6c as applicable. If the answer is "NO", skip to 7.		X		
6.a	If the facility chooses to implement RACT, is the RACT determination included for the affected pollutants for all affected emission units?				
6.b	If the facility chooses to demonstrate compliance with NAAQS by screen modeling, is the modeling analysis included?				
6.c	If refined modeling has been conducted, is a comprehensive modeling report along with all modeling files included?				
7	Does the application include an equipment list with the type, name, make, model, serial number, maximum rated capacity, and date of manufacture?	X			
8	Does the application include an identification and description of Pollution Controls? (if applicable)			X	The site does not have any air pollution controls.
9	For any application component claimed as confidential, are the requirements of AR.S. 49-432 and A.A.C. R18-2-305 addressed?			X	The application does not include confidential information.
10	For any current non-compliance issue, is a compliance schedule attached?			X	The site does not have any non-compliance issue.
11	For minor permit revision that will make a modification upon submittal of application, has a suggested draft permit been attached?			X	This permit application is for the renewal of a Title V air permit.
12	For major sources, have all applicable requirements been identified?	X			
13	For major sources, has a CAM applicability analysis been provided? For CAM applicable units, have CAM plans been provided?	X			
14	For major sources subject to requirements under Article 4 of the A.A.C., have all necessary New Source Review analyses identified in the application been presented?			X	

SECTION 3 – Process Description

Process Description

This section describes the processes associated with operations at Flagstaff Compressor Station. A process flow diagram of the gas and liquid streams at the station is presented in Section 4.0.

As indicated in the process flow diagram, natural gas enters the station via the inlet (suction) line. The inlet gas passes through an inlet separator where small amounts of entrained liquids are removed by gravitational separation. Any liquid collected is automatically dumped under pressure to the mist extractor to be loaded out on trucks for off-site removal. Alternatively, the liquid can be transferred to the condensate tank for storage prior to subsequent removal from the site via truck loading. Since Flagstaff Compressor Station is a mainline gas compressor station that transports pipeline-quality natural gas, very little liquid is collected at this site.

After the inlet separator the gas is piped to the single turbine-driven compressor unit (a General Electric LM2500 turbine without emission controls) where the gas pressure is boosted before the gas exits the station via the discharge line. The station has two Caterpillar gas-fired G3508 engine-driven generators to provide power for the facility. One of the two generators operates at all times, and operation is alternated between them throughout the year. Thus, the generator engines are not normally run simultaneously, except during the transition of operation of one unit to the other, which normally takes only a few minutes. However, while one unit is operating to produce power during normal operations, operation of the second generator is allowed for the purposes of maintenance and testing for a maximum of 240 hours per year between the two generators. Thus, the allowed total number of combined hours of operation between the two generator engines is 9,000 hours per year.

Pipeline maintenance activities include periodic pigging operations to remove any liquids trapped in the main transmission pipeline. There is a pig catcher/launcher system on site where the pipeline pig can be removed or inserted. Small amounts of natural gas are released to the atmosphere when the catcher/launcher vessel is opened to remove or insert the pig. In addition, there is a de-mister unit (mist extractor) on site to prevent pipeline liquid droplets from being ejected from the receiver unit when the pipeline pig enters the station. These activities and the associated emissions of natural gas are classified as maintenance activities.

SECTION 4 – Process Flow Diagram

Process Flow Diagram

This section presents a process flow diagram in Figure 4-1, which shows the flow of natural gas and liquids through the station. This diagram supplements the process description discussed in Section 3.0.

Note that as discussed in Section 3.0, liquids are transferred from the inlet separator or from pigging operations to the mist extractor. Liquids collected in the mist extractor can be either loaded out to trucks for off-site removal or transferred to the condensate tank (TK-COND1) for storage and subsequent load out onto trucks for removal. In the process flow diagram, the mist extractor and condensate are represented together to represent these processes.

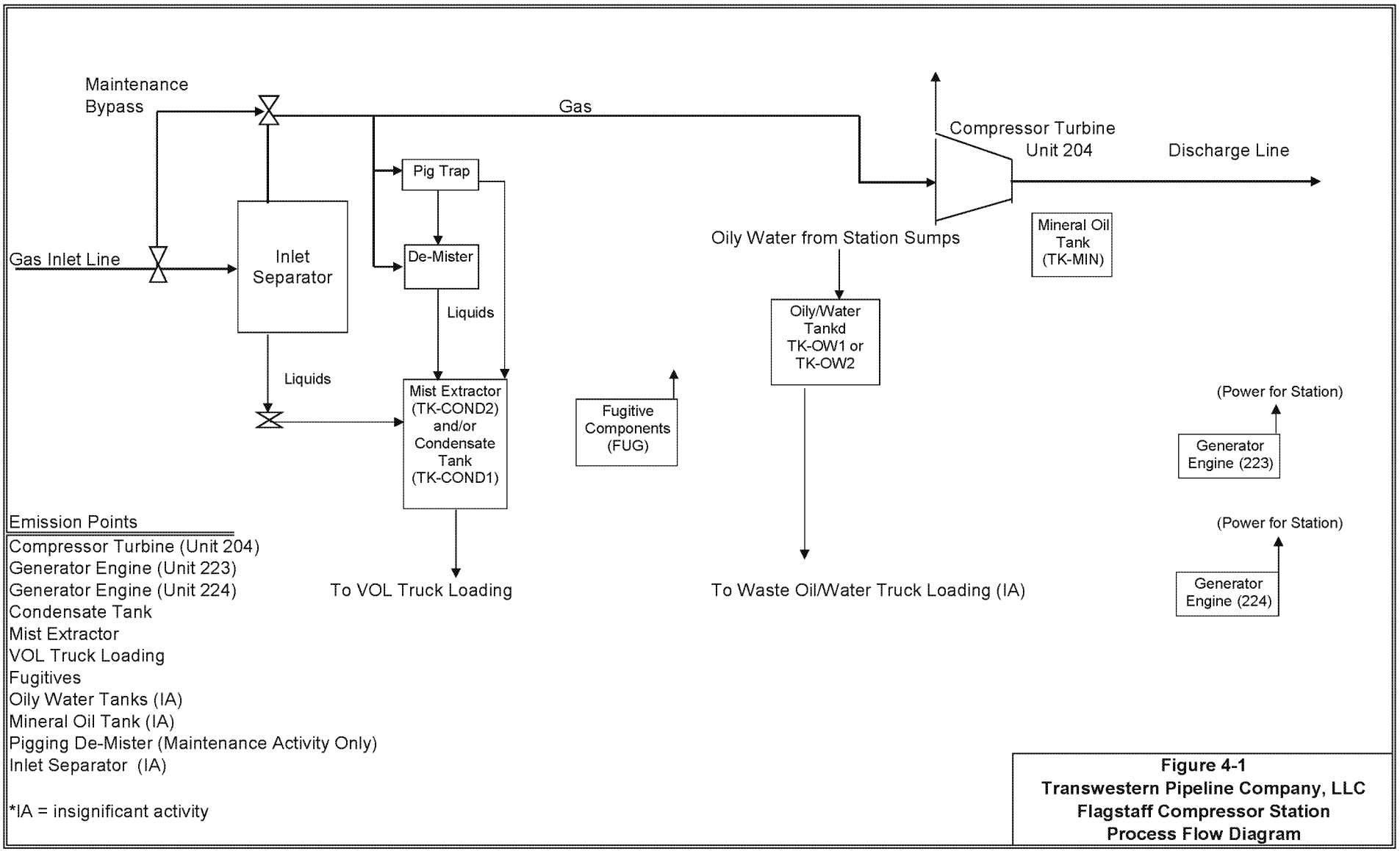


Figure 4-1
Transwestern Pipeline Company, LLC
Flagstaff Compressor Station
Process Flow Diagram

SECTION 5 – Area Maps and Site Diagrams

Area Maps and Site Diagrams

Figure 5-1 is a wide-area location map showing the general location of Flagstaff Compressor Station. A close-up location map that shows more detail of the area immediately around the station is presented in Figure 5-2.

Figure 5-3 is a site diagram that shows details of the layout of the station. To simplify this layout, a simplified plot plan is provided as Figure 5-4 and an aerial photo of a portion of the station is presented as Figure 5-5 to show the locations of the emissions sources and primary equipment that are represented on the process flow diagram contained in Section 4.0.

Figure 5-1
Flagstaff Compressor Station
Wide-Area Location Map

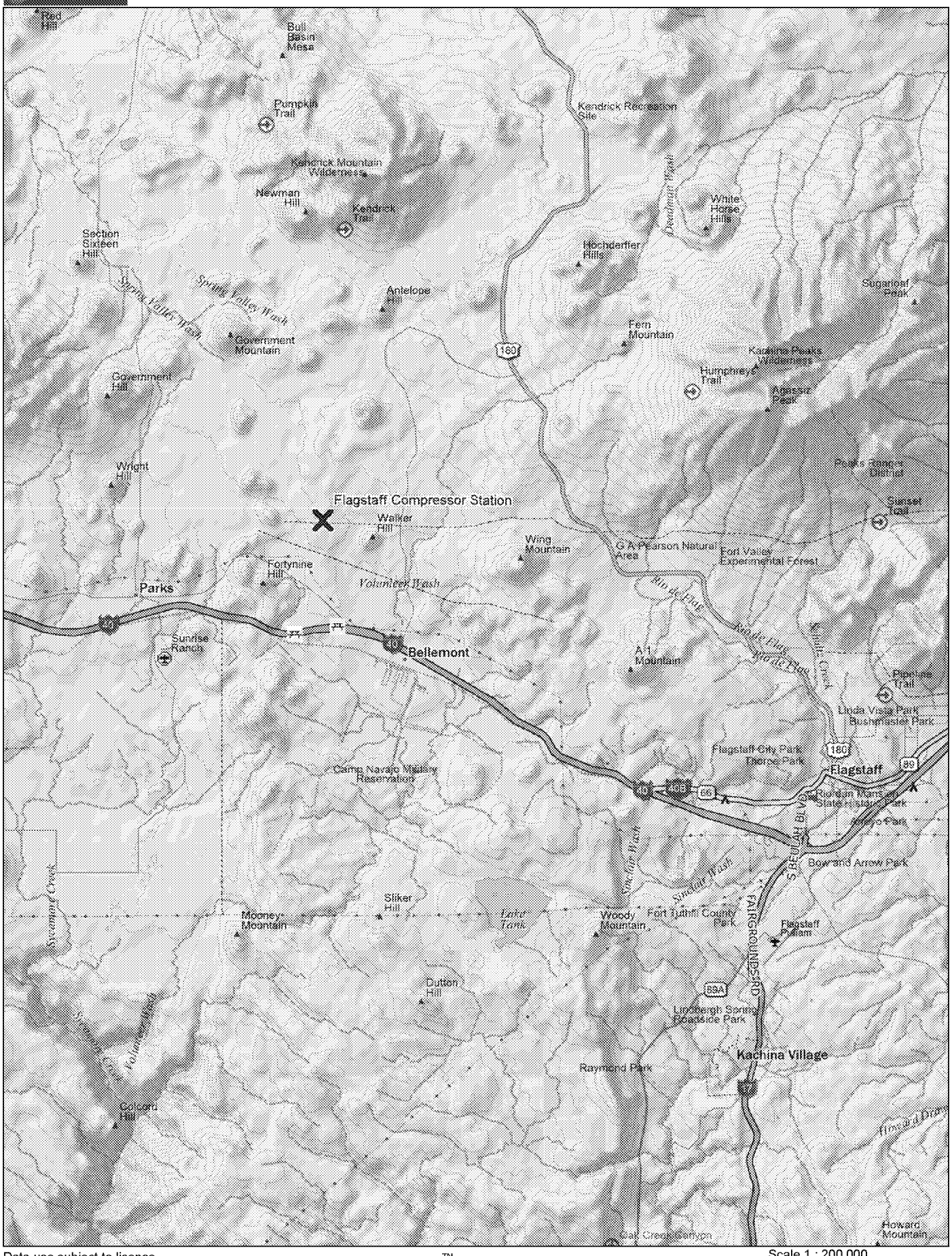
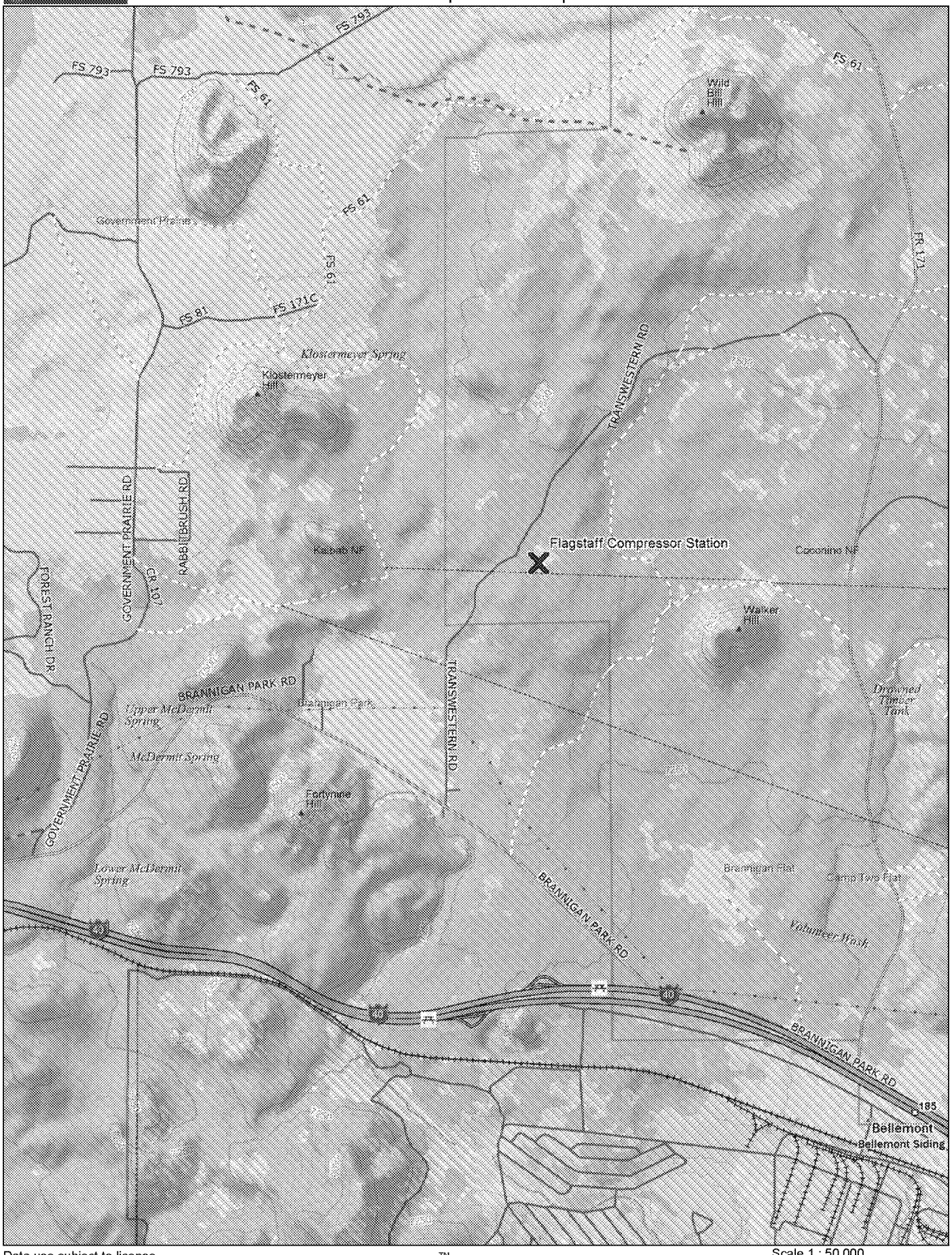


Figure 5-2
Flagstaff Compressor Station
Close-up Location Map

DELORME

Topo North America™ 9



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www.delorme.com

TN
MN (10.9°E)

Scale 1 : 50,000

1" = 4,166.7 ft

Data Zoom 12-0

PROPERTY LINE (BEARING DUE SOUTH 1320.00' COR. TO COR.)

PROPERTY LINE (BEARING DUE NORTH 1320.00' COR. TO COR.)

PROPERTY LINE (BEARING DUE WEST 1320.00' COR. TO COR.)

PROPERTY LINE (BEARING DUE EAST 1320.00' COR. TO COR.)

4.958 ACRES

ADD RESIDENCES A & B ENTRANCE-WAY COVERS & 20' WIDE ASPHALT ROAD (9)

INCINERATOR

REMOVED COTTAGE 21 W.O. R34212 (17)

REMOVED COTTAGE 22 W.O. R34236 (17)

REMOVED COTTAGE 23 W.O. R34212 (17)

REMOVED COTTAGE 24 W.O. R34212 (17)

20' ASPHALT PAVED ROAD

FIRE HYDRANT & REEL SHED

60' HIGH T.V. TOWER

CATTLE GUARD

WAREHOUSE

JUNK BIN

STOOP 42'-6"x8'-6"

75'x120' PIPE RACK

24'x240' PIPE RACK

120'x24' PIPE RACK

24'x42' PIPE RACK

FLAGPOLE

GASOLINE STORAGE TANK (6000 GAL. CAPACITY)

GAS PUMP

STORAGE TANK AREA

ASPHALT PAVED AREA

OFFICE & WAREHOUSE

COMM. SNA

LOADING DOCK

LOADING RAMP

27'x28'

WATER TOWER

INCINERATOR

WATER WELL

WATER TANK (15)

STORAGE WAREHOUSE

TURBOCHARGER AREA

AUX. BLDG.

DOMESTIC WTR. TANK BLDG.

START-AIR STORAGE

COMPRESSOR BUILDING

CONTROL BUILDING

SUMP PUMP

210 BBL TANK

400 BBL TANK

BOILER, CHARCOAL FILTER, OIL & WATER SEPARATOR & PUMP (19)

10' WIDE DIRT ROAD

7' OPENING IN CURB FOR DRAINAGE

30" SUCTION

210 BBL. METHANOL STO. TANK 2' HIGH WALL

BURNPIT-BACKFILLED & ABANDONED

DRIP-BLOW DOWN TANK

CONTAINMENT COVERS (S33515)

12" HIGH WALL

P/L WASTE MUFFLER (13)

STATION BLOWDOWN AREA

PIG LAUNCHER AREA

30" DISCHARGE

STATION BY-PASS

10' WIDE DIRT ROAD

PIG TRAP & SCRUBBER AREA

TRUCK LOADING METER HOUSE

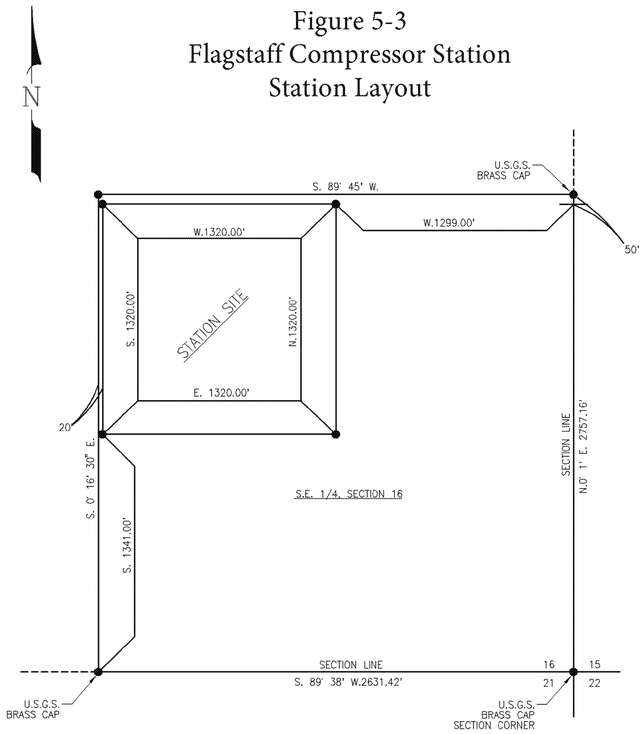
CONTAINMENT COVER (S33515) FOR DETAIL SEE TYP. DWG. T-16601

MONUMENT STATION BENCH MARK

N.13+00' N.12+00' N.11+00' N.10+00' N.9+00' N.8+00' N.7+00' N.6+00' N.5+00' N.4+00' N.3+00' N.2+00' N.1+00'

W.13+00' W.12+00' W.11+00' W.10+00' W.9+00' W.8+00' W.7+00' W.6+00' W.5+00' W.4+00' W.3+00' W.2+00' W.1+00'

Figure 5-3
Flagstaff Compressor Station
Station Layout



LOCATION PLAT
SCALE 1"=400'

A 40 ACRE SITE LOCATED IN THE N.W.1/4 OF THE S.E. 1/4 OF SECTION 16, T-22N, R-5E; COCONINO COUNTY, ARIZONA

NOTE:
THIS DRAWING REPLACED, A11-1AA

REFERENCE DRAWINGS:
1. COMPRESSOR BUILDING DWG.# 2-AB-A11-65
2. AUXILIARY BUILDING DWG.# 2-AB-A11-66

NO.	REVISION - DESCRIPTION	BY	DATE	CHK'D	APP'D
20	STATION MODIFICATIONS - RED ROCK EXPANSION PER WO. C.014632.01/.02	JML	10/07/04	GAG	
19	INSTALLED OIL & WATER SEPARATOR PER WO. S35204	JML	9/04/97	JGS	
18	FACILITY AS-BUILT WO. S33600	AAH	8/09/96	SP	
17	RETIRE COTTAGES 21,22,23,24 UNDER WO. R34236 & R34212	TGG	4/17/95		
16	INSTALL CONTAINMENT COVERS OVER PIGGING FAGILITIES PER WO. S73515, 4-20-94	LTM	6/13/94	TGG	
15	ADD 25,000 GAL. WATER TANK (WO. S32239, 12-07-92)	LTM	8/30/92	ARW	
14	INSTALLED SEC. GATE AS PER WO. BM 5100-04	G&A	11/23/92		
13	INSTALL CONCRETE CONT. WALLS FOR MISC. WO. 31295 DTD. 12-15-91	G&A	2/03/92		
12	INSTALL ENTRANCE WAYS ON COTTAGES WO. 24168 12-11-86	G&A	7/23/90		
11	ADD COMM. SNA PER WO. 39077	G&A	6/06/90		
10	AS BUILT PER AFE - 23034	TSI	9/20/88		
9	AS-BUILT PER AFE 24308	TSI	2/29/88	PW	
8	ADDED 210 BBL. TANK & SUMP PER AFE - 24101	TSI	2/23/88	PW	

DWG. NO.	REFERENCE DRAWING TITLE
2-AB-A12-9A	COMPRESSOR BLDG. GROUNDING PLAN
2-AB-A12-9	COMPRESSOR BLDG. AREA ELEC. PLAN
2-AB-A12-1	ELECTRICAL PLOT & KEY PLAN
2-AB-A11-1	KEY PIPING PLAN
2-AB-A4-2	FOUNDATION LOCATION PLAN (AUX. SIDE)
2-AB-A4-1	FOUNDATION LOCATION PLAN (H.P. SIDE)
2-AB-A1-4	GENERAL STATION DETAILS
2-AB-A1-3	GEN. PLAN, ROADS, WALKS & CURBS
2-AB-A1-2	GENERAL GRADING PLAN

NO.	REVISION - DESCRIPTION	BY	DATE	CHK'D	APP'D
7	INSTALLED 210 BBL. METHANOL TANK PER 23411	GMG	1/22/85		
6	INSTALLED LIQUID STORAGE TANK AS PER WO-23034	JH	8/17/84	CH	
5	FENCE REVISED PER MJ. 1-81-10	JR	12/14/82	DT	
4	ADD WATER TANK BLDG. TO AUX. BLDG. PER FIELD INFO.	JR	7/26/82	DT	
3	AS-BUILT PER MJN.80-1-1-9 (RESURFACED ROAD)	MA	7/21/82	DT	
2	ADDED GAS STORAGE TANK & PUMP PER W.O 219.79	JAW	12/10/80	DM	
1	DRAWING REDRAWN & UPDATED PER AS-BUILT	PN	10/10/97	LP	

DWG. STATUS	CHECKED BY	CHECKED DATE	APPROVED BY	APPROVED DATE	APPROVED BY	APPROVED DATE
PREL'Y						
BID						
CONSTR.						
CADDS	PLOT DATE:					
	FILE NAME: C.014632.01\2-AB-A1-1					

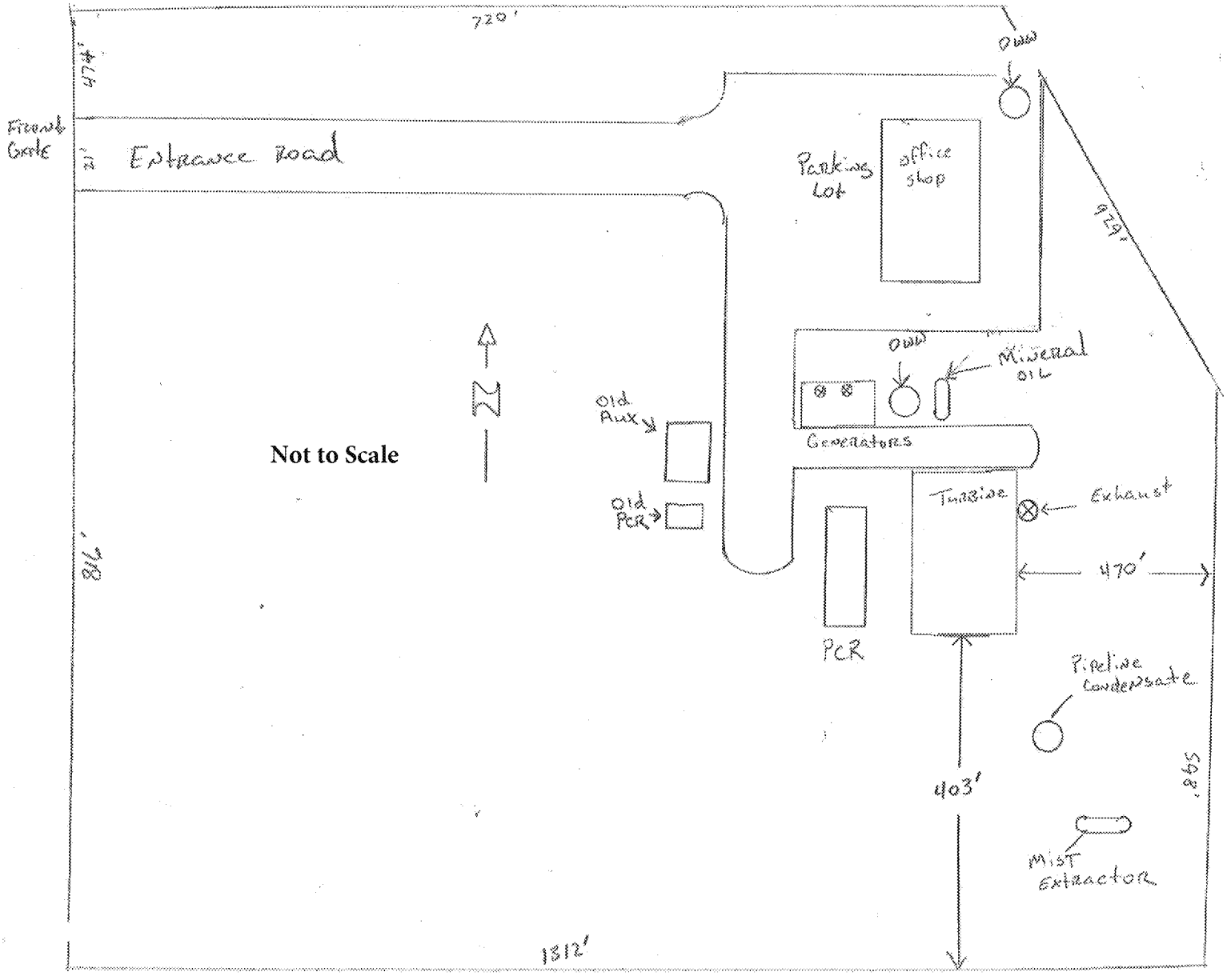
P.L./STA. NO.			2
ACCOUNT NO.			
CONSTRUCTION YEAR			2001
	BY	DATE	
DESIGN			
DRAWN	JML	10/8/04	
ASBUILT	JML	10/8/04	
FILE NO.			
SCALE: 1"=60'-0"			

Transwestern Pipeline Company
Hourston, Texas

COMPRESSOR STATION No. 2 - FLAGSTAFF GENERAL PLAN

COCONINO COUNTY, ARIZONA

PROJECT NO. C.014632.01
PREVIOUS DWG. NO.
SHEET OF
DWG. NO. 2-AB-A1-1 (1)
SHEET 1 OF 1



Note: locations and distances are approximate.

Figure 5-4
Flagstaff Compressor Station
Simplified Plot Plan

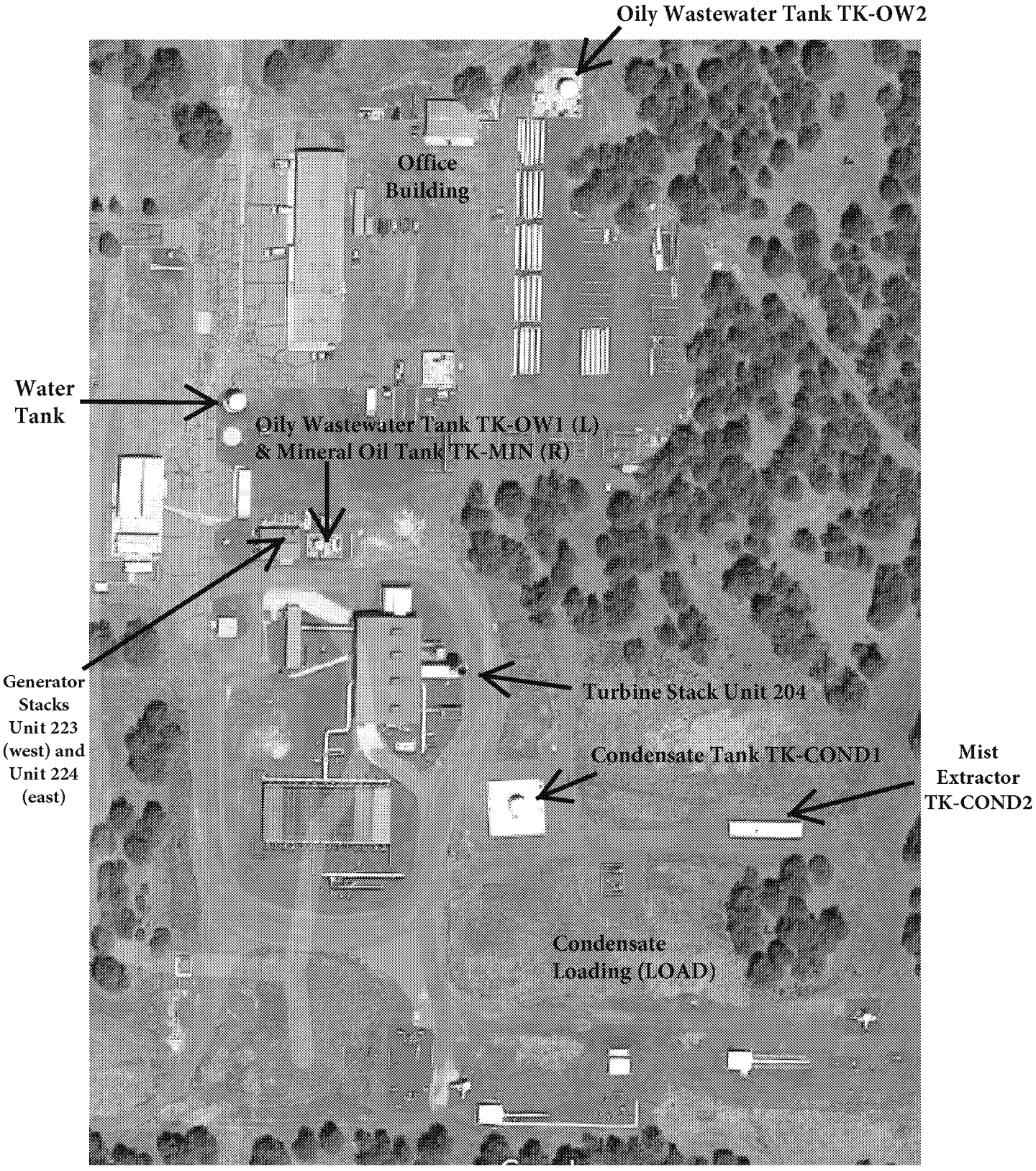


Figure 5-5
Flagstaff Compressor Station
Aerial Photo of Emissions Sources

SECTION 6 – Emission Calculations

Emission Calculations

This section presents tables showing calculations of emissions at Flagstaff Compressor Station. The calculations are explained below or on each table. An emissions summary table is also included in this section. Note that for all sources of particulate matter, emissions of particulate matter with an aerodynamic diameter of less than 10 micrometers (PM_{10}) and particulate matter with an aerodynamic diameter of less than 2.5 micrometers ($PM_{2.5}$) are both conservatively taken to be equal to the emissions of total particulate matter, which is designated as PM.

The station's General Electric LM2500 turbine is a natural gas-fired turbine. Potential emissions from the turbine are taken from currently permitted levels. For oxides of nitrogen (NO_X), carbon monoxide (CO), and total hydrocarbons (THC), maximum hourly emissions are based on the maximum of the hourly emission rates at various temperatures and turbine loading conditions. Annual emission of these contaminants are based on both the maximum base-load emissions levels and the maximum emissions at any load. Potential annual emissions are calculated assuming that the turbine runs at base load 80 percent of the time and at the load level that yields the maximum hourly emissions for the remaining 20 percent of the time, and then increased by a 15 percent safety factor to be conservative. Emissions of volatile organic compounds (VOC) are determined by multiplying the THC emissions level by a factor of 0.1, which reflects an assumption that VOCs compose 10 percent of THC.

Potential turbine emissions of PM, sulfur dioxide (SO_2), and formaldehyde are calculated using emission factors taken from U.S. Environmental Protection Agency AP-42, Section 3.1, Tables 3.1-2a (for PM and SO_2), and 3.1-3 (for formaldehyde). These emission factors are provided in Section 7.0. Potential hourly emissions are calculated using the maximum heat rate and maximum shaft horsepower rating, and potential annual emissions are calculated using the average heat rate and average shaft horsepower rating.

The station has two Caterpillar G3508 engine-driven generators to provide power for the facility. These engines are 526-horsepower, natural gas-fired four-stroke, rich-burn engines. Potential emissions are taken to be identical for both engines and are based on currently permitted levels. Hourly emission factors for NO_X, CO, and nonmethane hydrocarbons (NMHC) are taken from vendor-provided factors; a vendor data sheet is provided in Section 7.0. Emission factors for PM, SO_2, and formaldehyde are taken from AP-42, Section 3.2, Table 3.2-3; these factors are also provided in Section 7.0. The heat rate is taken from previous permit applications for this station.

Annual potential emissions for the generator engines are calculated from the hourly emissions data with an assumed total number of operating hours for both engines collectively of 9,000 per year. This total allows for one of the generator engines to be operating at all times with the other operating simultaneously for up to 240 hours per year for purposes of maintenance and testing.

Potential emissions from the condensate tank and mist extractor were calculated using EPA TANKS 4.09d software. A product of gasoline with a Reid vapor pressure of 6.0 pounds per square inch was used to simulate condensate in the TANKS software runs. The annual condensate throughput of 15,330 gallons per year was based on an assumed daily throughput of 1.0 barrel per day for the entire year. Tank flash emission calculations were made using E&P TANK Version 1.0 software. These emissions can occur at either the condensate tank or the mist extractor, depending on the current configuration of the station. In this application, the tank flashing emissions calculation table shows the emission to be from source ID TK-COND2, which is the mixt extractor.

Loading emissions are calculated using methodology contained in AP-42, Section 5.2-2 (Equation (1)). As in the tank emission calculations, the annual loading throughput is based on an average of 1.0 barrel of condensate loaded per day for each day of the year, resulting in an annual throughput of 15,330 gallons per year. Maximum hourly loading emissions are based on loading a maximum of one tanker truck per hour with a throughput equal to a typical tanker truck capacity of 210 barrels, or 8,400 gallons. The temperature and pressure of the liquid loaded are taken from TANKS 4.09d output used to estimate condensate storage tank emissions, where average values are used in the calculation of annual emissions and the maximum vapor pressure and minimum temperature are used in the calculation of maximum hourly emissions. A saturation factor (S) of 0.6 was used in the calculations to reflect submerged filling of the tank and dedicated normal service for the loading operation.

Fugitive emissions were calculated using estimated component counts for the station that have used in previous permit applications. Emission factors were taken from EPA-453/R-95-017, *Protocol for Equipment Leak Emission Estimates*, Table 2-4, for Oil and Gas Production Operations Average Emission Factors.

Greenhouse gas emissions are calculated using the methodology of 40 CFR Part 98, Subpart C. Total emissions of presented as carbon dioxide equivalent emission in both tons and metric tons per year.

TRANSWESTERN PIPELINE COMPANY, LLC
TITLE V RENEWAL
FLAGSTAFF COMPRESSOR STATION

Table 6-1. Annual Potential to Emit Emissions Summary

Source Description	ID	NO_X (tpy)	CO (tpy)	PM (tpy)	SO2 (tpy)	VOC (tpy)	Formaldehyde (tpy)	GHG (MT/yr CO2e)
GE LM2500	*204*	*116.96*	*71.12*	*6.41*	*3.30*	*2.44*	*0.69*	*163,768*
Caterpillar 3508	*223/224*	*112.05*	*7.92*	*0.38*	*0.011*	*0.95*	*0.40*	*2,076*
Condensate Tank	*TK-COND1*					*0.70*		
Mist Extractor	*TK-COND2*					*0.11*		
Loading Emissions	*LOAD*					*0.018*		
Fugitives	*FUG*					*2.37*		
Flashing Emissions	*Flash*					*4.70*		
TOTALS		***229.01***	***79.04***	***6.79***	***3.31***	***11.29***	***1.09***	***165,844***

Notes:
NOx - Oxides of nitrogen
CO - Carbon monoxide
PM - Particulate matter (total); emissions of PM2.5 and PM10 are taken as the same totals as represented for PM.
SO2 - Sulfur dioxide
VOC - Volatile organic compounds
GHG - Greenhouse gases
tpy - tons per year
MT/yr CO2e - Metric tons per year of carbon dioxide equivalent

TRANSWESTERN PIPELINE COMPANY, LLC

TITLE V RENEWAL

FLAGSTAFF COMPRESSOR STATION

Table 6-2. Turbine Emissions Information

Manufacturer/Model:	GE LM2500	
Fuel Type:	Sweet Natural Gas	
HHV:	1050	Btu/scf
Site Elevation:	7458	
Inlet Loss:	4.0	in H_2O
Exhaust Loss:	4.0	in H_2O
Shaft Power:	37270	hp @ 12.8°F (Base Load)
	30565	hp @ 60°F (Base Load)
Max Heat Rate:	9451	Btu/hp-hr @95°F (50% Load)
	352.24	MMBtu/hr (Max Heat Rate x shp@12.8°F)
Avg Heat Rate:	6308	Btu/hp-hr @60°F (Base Load)
	192.8	MMBtu/hr (Avg Heat Rate x shp@60°F)
Speed:	6100	rpm
Max Hourly Fuel:	0.34	MMscf/hr (Max Heat Rate / HHV)
Avg Hourly Fuel:	0.18	MMscf/hr (Avg Heat Rate / HHV)
Annual Fuel:	1608.54	MMscf/yr (Avg Fuel x 8760)

Potential Emissions

Temp	Turbine	NOx (as NO_2)		CO		THC	
(°F)	Load (%)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
0	Base	22.40	98.11	13.60	59.57	4.6	20.15
0	64	25.30	110.81	15.40	67.45	5.4	23.65
0	50	23.00	100.74	14.00	61.32	4.9	21.46
12.8	Base	22.70	99.43	13.80	60.44	4.7	20.59
12.8	50	22.60	98.99	13.70	60.01	4.8	21.02
40	Base	20.80	91.10	12.60	55.19	4.3	18.83
40	50	20.50	89.79	12.50	54.75	4.4	19.27
60	Base	19.40	84.97	11.80	51.68	4	17.52
60	50	13.20	57.82	8.10	35.48	2.7	11.83
95	Base	16.90	74.02	10.30	45.11	3.5	15.33
95	50	11.90	52.12	7.30	31.97	2.5	10.95
	Max Hourly	25.30	110.81	15.40	67.45	5.40	23.65
	Base Load Max	22.70	99.43	13.80	60.44	4.70	20.59

AP-42 Emission Factors (04/00) for Stationary Gas Turbines, Table 3.1-2a (PM and SO_2) and 3.1-3 (for formaldehyde)

PM	6.60E-03	lb/MMBtu
SO_2	3.40E-03	lb/MMBtu
Formaldehyde	7.10E-04	lb/MMBtu

Proposed Turbine Emissions

Pollutant	Maximum (lb/hr)	Annual (tpy)	ASSUMPTIONS
NOX	25.30	101.70	@base load 80% of time, 64% load 20% of time
CO	15.40	61.85	@base load 80% of time, 64% load 20% of time
VOC	0.54	2.12	@base load 80% of time, 64% load 20% of time; assume 10% NMHC
PM	2.32	5.57	@max hourly based on max heat rate, annuals based on avg heat rate
SO_2	1.20	2.87	@max hourly based on max heat rate, annuals based on avg heat rate
Formaldehyde	0.25	0.60	@max hourly based on max heat rate, annuals based on avg heat rate

Proposed Turbine Emissions Plus 15% Safety Factor

(Calculations appear on the next page)

Pollutant	Maximum (lb/hr)	Annual (tpy)
NOX	29.10	116.96
CO	17.71	71.12
VOC	0.62	2.44
PM	2.67	6.41
SO_2	1.38	3.30
Formaldehyde	0.29	0.69

TRANSWESTERN PIPELINE COMPANY, LLC

TITLE V RENEWAL

FLAGSTAFF COMPRESSOR STATION

Table 6-3. Turbine Emissions Calculations

Manufacturer/Model:	GE LM2500	
Fuel Type:	Sweet Natural Gas	
HHV:	1050	Btu/scf
Site Elevation:	7458	
Inlet Loss:	4.0	in H_2O
Exhaust Loss:	4.0	in H_2O
Shaft Power:	37270	hp @ 12.8°F (Base Load)
	30565	hp @ 60°F (Base Load)
Max Heat Rate:	9451	Btu/hp-hr @95°F (50% Load)
	352.24	MMBtu/hr (Max Heat Rate x shp@12.8°F)
Avg Heat Rate:	6308	Btu/hp-hr @60°F (Base Load)
	192.8	MMBtu/hr (Avg Heat Rate x shp@60°F)
Speed:	6100	rpm
Max Hourly Fuel:	0.34	MMscf/hr (Max Heat Rate / HHV)
Avg Hourly Fuel:	0.18	MMscf/hr (Avg Heat Rate / HHV)
Annual Fuel:	1608.54	MMscf/yr (Avg Fuel x 8760)

Potential Emissions

Temp	Turbine	NOx (as NO_2)		CO		THC	
(°F)	Load (%)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
0	Base	22.40	98.11	13.60	59.57	4.6	20.15
0	64	25.30	110.81	15.40	67.45	5.4	23.65
0	50	23.00	100.74	14.00	61.32	4.9	21.46
12.8	Base	22.70	99.43	13.80	60.44	4.7	20.59
12.8	50	22.60	98.99	13.70	60.01	4.8	21.02
40	Base	20.80	91.10	12.60	55.19	4.3	18.83
40	50	20.50	89.79	12.50	54.75	4.4	19.27
60	Base	19.40	84.97	11.80	51.68	4	17.52
60	50	13.20	57.82	8.10	35.48	2.7	11.83
95	Base	16.90	74.02	10.30	45.11	3.5	15.33
95	50	11.90	52.12	7.30	31.97	2.5	10.95
	Max Hourly	25.30	110.81	15.40	67.45	5.40	23.65
	Base Load Max	22.70	99.43	13.80	60.44	4.70	20.59

AP-42 Emission Factors (04/00) for Stationary Gas Turbines, Table 3.1-2a (PM and SO_2) and 3.1-3 (for formaldehyde)

PM	6.60E-03	lb/MMBtu
SO_2	3.40E-03	lb/MMBtu
Formaldehyde	7.10E-04	lb/MMBtu

Proposed Turbine Emissions

Pollutant	Maximum (lb/hr)	Annual (tpy)	CALCULATIONS
NOX	25.30	101.70	101.7 tpy = (99.43*0.8) + (110.81*0.2)
CO	15.40	61.85	61.85 tpy = (60.44*0.8) + (67.45*0.2)
VOC	0.54	2.12	2.12 tpy = [(20.59*0.8) + (23.65*0.2)]*0.1
PM	2.32	5.57	5.57 tpy = 0.0066*192.8*8760/2000
SO_2	1.20	2.87	2.87 tpy = 0.0034*192.8*8760/2000
Formaldehyde	0.25	0.60	0.60 tpy = 0.00071*192.8*8760/2000

Proposed Turbine Emissions Plus 15% Safety Factor

Pollutant	Maximum (lb/hr)	Annual (tpy)	
NOX	29.10	116.96	116.96 tpy = 101.7*1.15
CO	17.71	71.12	71.12 tpy = 61.85*1.15
VOC	0.62	2.44	2.44 tpy =2.12*1.15
PM	2.67	6.41	6.41 tpy = 5.57*1.15
SO_2	1.38	3.30	3.30 tpy = 2.87*1.15
Formaldehyde	0.29	0.69	0.69 tpy = 0.60*1.15

TRANSWESTERN PIPELINE COMPANY, LLC
TITLE V RENEWAL
FLAGSTAFF COMPRESSOR STATION

Table 6-4. Generator Engines Emissions Calculations

Manufacturer/Model:	Caterpillar 3508		
Fuel Type:	Sweet Natural Gas		
Site Elevation:	7458		
Rated Power:	526	hp @100% Load	
Fuel Flow Rate:	71	scf/min	(mfr data)
	4260	scf/hr	
	37.32	MMscf/yr	
HHV	1020	Btu/scf	(estimate)
Heat Rate:	8261	Btu/hp-hr	
	4.35	MMBtu/hr	
Speed:	1200	rpm	
Operating Schedule[1]:	8760	hours/yr	(normal operation)
	240	hours/yr	(additional hours allotted for concurrent maintenance and testing)
	9000	hours/yr	(total potential hours of operation)

Emission Factors

Pollutant	Rate	Units	Source	
NOx	24.90	lb/hr	Mfr	
CO	1.76	lb/hr	Mfr	
NMHC	0.21	lb/hr	Mfr	
PM	0.01941	lb/MMBtu	AP-42	(Table 3.2-3, sum of PM10 (filterable) and PM Condensable)
SO2	0.000588	lb/MMBtu	AP-42	(Table 3.2-3)
Formaldehyde	0.0205	lb/MMBtu	AP-42	(Table 3.2-3)

Proposed Generator Engine Emissions

Pollutant	Maximum (lb/hr)	Annual (tpy)	
NOx	24.90	112.05	112.05 ton/yr = 24.9 lb/hr*9000 hr/yr*ton/2000 lb
CO	1.76	7.92	7.92 ton/yr = 1.76 lb/hr*9000 hr/yr*ton/2000 lb
VOC	0.21	0.95	0.95 ton/yr = 0.21 lb/hr*9000 hr/yr*ton/2000 lb
PM	0.084	0.38	0.38 ton/yr = 4.35 MMBtu/hr*0.01941 lb/MMBtu*9000 hr/yr*ton/2000 lb
SO2	0.0026	0.011	0.011 ton/yr = 4.35 MMBtu/hr*0.000588 lb/MMBtu*9000 hr/yr*ton/2000 lb
Formaldehyde	0.089	0.40	0.40 ton/yr = 4.35 MMBtu/hr*0.0205 lb/MMBtu*9000 hr/yr*ton/2000 lb

Note:

1. Two Caterpillar G3508 generator engines operate on site to produce power for the station.
   Normally, only one unit runs at a time, with the second unit on standby.
   However, to allow one of the generators to be operated for maintenance and testing purpose while the other is running as part of normal operations to produce power, the total allowable combined hours of operation between both generators is 9,000 hours per year.

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Table 6-5. Storage Tank Emissions

Tank ID	Contents	Capacity (gallons)	Annual Throughput (gal/yr)	Maximum Fill Rate (gal/hr)	Working Losses (lb/yr)	Standing Losses (lb/yr)	Annual Emissions (tpy)	Max Hourly Emissions (lb/hr)
TK-COND1	Condensate	23,300	15,330	4,200	57.17	1347.24	0.70	15.82
TK-COND2	Condensate	1,260	15,330	4,200	57.17	170.00	0.11	15.68
TOTAL			30,660		114.34	1517.24	0.82	31.50

Notes:

1. Working and Standing Losses were calculated using the U.S. Environmental Protection Agency TANKS 4.09d software. Output from the software showing the working and standing losses is attached.
2. Maximum fill rate is conservatively estimated.
3. Maximum hourly emission rate sample calculation: (15330 gal/yr) / (4200 gal/hr) = 3.65 hr/yr loading time

Working Losses:	(57.17 lb/yr) / (3.65 hr/yr) =	15.66	lb/hr
Standing losses:	(1347.24 lb/yr) / (8,760 hr/yr) =	0.15	lb/hr
Total losses:	15.66 lb/hr + 0.15 lb/hr =	15.81	lb/hr

4. Mineral oil tank and oily wastewater tank emissions are assumed to be insignificant due to small capacity, low vapor pressure, and low throughput.

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	TK-COND1 - Flagstaff Condensate Tank
City:	Flagstaff
State:	Arizona
Company:	Transwestern Pipeline Company, LLC
Type of Tank:	Vertical Fixed Roof Tank
Description:	Capacity is 23,300 gallons

Tank Dimensions

Shell Height (ft):	15.50
Diameter (ft):	16.00
Liquid Height (ft) :	10.20
Avg. Liquid Height (ft):	5.10
Volume (gallons):	15,341.34
Turnovers:	1.00
Net Throughput(gal/yr):	15,330.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Dome
Height (ft)	2.00
Radius (ft) (Dome Roof)	16.00

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Flagstaff, Arizona (Avg Atmospheric Pressure = 11.43 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

TK-COND1 - Flagstaff Condensate Tank - Vertical Fixed Roof Tank
Flagstaff, Arizona

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (RVP 6)	All	47.94	40.49	55.38	45.76	2.2701	1.9256	2.6636	69.0000			92.00	Option 4: RVP=6, ASTM Slope=3

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

TK-COND1 - Flagstaff Condensate Tank - Vertical Fixed Roof Tank
Flagstaff, Arizona

Annual Emission Calcaulations	
Standing Losses (lb):	1,347.2370
Vapor Space Volume (cu ft):	2,296.2948
Vapor Density (lb/cu ft):	0.0288
Vapor Space Expansion Factor:	0.1327
Vented Vapor Saturation Factor:	0.4212
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	2,296.2948
Tank Diameter (ft):	16.0000
Vapor Space Outage (ft):	11.4208
Tank Shell Height (ft):	15.5000
Average Liquid Height (ft):	5.1000
Roof Outage (ft):	1.0208
Roof Outage (Dome Roof)	
Roof Outage (ft):	1.0208
Dome Radius (ft):	16.0000
Shell Radius (ft):	8.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0288
Vapor Molecular Weight (lb/lb-mole):	69.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.2701
Daily Avg. Liquid Surface Temp. (deg. R):	507.6080
Daily Average Ambient Temp. (deg. F):	45.7375
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	505.4275
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,630.1861
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1327
Daily Vapor Temperature Range (deg. R):	29.7737
Daily Vapor Pressure Range (psia):	0.7380
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.2701
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	1.9256
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	2.6636
Daily Avg. Liquid Surface Temp. (deg R):	507.6080
Daily Min. Liquid Surface Temp. (deg R):	500.1646
Daily Max. Liquid Surface Temp. (deg R):	515.0515
Daily Ambient Temp. Range (deg. R):	30.5750
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.4212
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	2.2701
Vapor Space Outage (ft):	11.4208
Working Losses (lb):	57.1733

Vapor Molecular Weight (lb/lb-mole):	69.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.2701
Annual Net Throughput (gal/yr.):	15,330.0000
Annual Turnovers:	0.9993
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	15,341.3372
Maximum Liquid Height (ft):	10.2000
Tank Diameter (ft):	16.0000
Working Loss Product Factor:	1.0000

Total Losses (lb):	1,404.4103

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

TK-COND1 - Flagstaff Condensate Tank - Vertical Fixed Roof Tank
Flagstaff, Arizona

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 6)	57.17	1,347.24	1,404.41

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	TK-COND2 - Flagstaff MIST Extractor for Condensate
City:	Flagstaff
State:	Arizona
Company:	Transwestern Pipeline Company, LLC
Type of Tank:	Horizontal Tank
Description:	Horizontal tank with a capacity of 1,260 gallons

Tank Dimensions

Shell Length (ft):	32.00
Diameter (ft):	3.00
Volume (gallons):	1,175.00
Turnovers:	0.00
Net Throughput(gal/yr):	15,330.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Flagstaff, Arizona (Avg Atmospheric Pressure = 11.43 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

TK-COND2 - Flagstaff MIST Extractor for Condensate - Horizontal Tank
Flagstaff, Arizona

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (RVP 6)	All	47.94	40.49	55.38	45.76	2.2701	1.9256	2.6636	69.0000			92.00	Option 4: RVP=6, ASTM Slope=3

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

TK-COND2 - Flagstaff MIST Extractor for Condensate - Horizontal Tank
Flagstaff, Arizona

Annual Emission Calcaulations	
Standing Losses (lb):	169.9985
Vapor Space Volume (cu ft):	144.0730
Vapor Density (lb/cu ft):	0.0288
Vapor Space Expansion Factor:	0.1327
Vented Vapor Saturation Factor:	0.8471
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	144.0730
Tank Diameter (ft):	3.0000
Effective Diameter (ft):	11.0586
Vapor Space Outage (ft):	1.5000
Tank Shell Length (ft):	32.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0288
Vapor Molecular Weight (lb/lb-mole):	69.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.2701
Daily Avg. Liquid Surface Temp. (deg. R):	507.6080
Daily Average Ambient Temp. (deg. F):	45.7375
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	505.4275
Tank Paint Solar Absorptance (Shell):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,630.1861
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1327
Daily Vapor Temperature Range (deg. R):	29.7737
Daily Vapor Pressure Range (psia):	0.7380
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.2701
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	1.9256
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	2.6636
Daily Avg. Liquid Surface Temp. (deg R):	507.6080
Daily Min. Liquid Surface Temp. (deg R):	500.1646
Daily Max. Liquid Surface Temp. (deg R):	515.0515
Daily Ambient Temp. Range (deg. R):	30.5750
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.8471
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	2.2701
Vapor Space Outage (ft):	1.5000
Working Losses (lb):	57.1733
Vapor Molecular Weight (lb/lb-mole):	69.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.2701
Annual Net Throughput (gal/yr.):	15,330.0000
Annual Turnovers:	0.0000
Turnover Factor:	1.0000

TANKS 4.0 Report

Tank Diameter (ft):	3.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	227.1718

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

TK-COND2 - Flagstaff MIST Extractor for Condensate - Horizontal Tank
Flagstaff, Arizona

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 6)	57.17	170.00	227.17

TRANSWESTERN PIPELINE COMPANY, LLC
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Table 6-6. Tank Flashing Emissions

Tank ID	Contents	Capacity (gallons)	Annual Throughput (gallons/year)	Maximum Transfer Rate (gallons/day)	Hourly VOC Emissions (pounds/hour)	Annual VOC Emissions (tons/year)
TK-COND2	Condensate	1,260	15,330	42	1.07	4.70

Note: In the main line pipeline, small amounts of liquids are transported. Each compressor station is equipped with scrubbers that knock out the liquids and collect them in basins with a valve at the bottom. Periodically, the valve is opened briefly and main line pressure (870 psig) blasts the liquid from the basin to the mist extractor, prior to being pumped to the condensate tank. The mist extractor is present to prevent mist and droplets of liquid from being released to the atmosphere when the pressure drops from 870 psig to atmospheric. Flashing emissions were estimated with E&P Tanks Version 1.0 for Windows and the printout is presented behind this page.

Because of the small amount of liquids actually collected at the Flagstaff Station, very little or no liquid is transferred to the main condensate tank. The mist extractor occasionally stores liquids and is called a condensate tank in this application. The amount of liquid being handled by the mist extractor is conservatively estimated as 1 barrel (42 gallons) per day for calculation purposes.

E&P Report

E&P TANK Version 1.0 for Windows
Developed by DB Robinson & Associates, Ltd.
Compilation Date: 09/26/2008

FLASHING EMISSIONS
Main line scrubbers into mist extractor.

Project Name: mist extract
Field Name: Station 1 and 2 Tank
Facility/Well Name:
Facility/Well ID:
Facility Permit #:
Date:
General Notes:

Input Summary

Summary Information:

Separator Pressure:	870.00	psig
Separator Temperature:	78.00	°F
Ambient Pressure:	14.70	psia
Ambient Temperature:	78.00	°F
Sales Oil API Gravity:	57.00	
Sales Oil RVP:	13.10	psia
Production Rate:	1.00	bbl/day

Results Summary

Calculation Methods:

C10+:	Molecular Weight Method
Flash Loss:	Adiabatic Flash
W&S Loss:	AP-42 Method

Output Summary:

UNCONTROLLED EMISSIONS

	(tons/yr)	(lb/hr)	(tonnes/yr)	(kg/hr)
HAPs:	0.1129	0.0258	0.1024	0.0117
Total HC:	8.3619	1.9091	7.5859	0.8660
C2+ VOC:	6.2086	1.4175	5.6324	0.6430
C3+ VOC:	4.7031	1.0738	4.2666	0.4871

GOR: 569.0919 scf/stb

CONTROLLED EMISSIONS

Control Efficiency = 95.0 %

	(tons/yr)	(lb/hr)	(tonnes/yr)	(kg/hr)
HAPs:	0.0056	0.0013	0.0051	0.0006

Total HC:	0.4181	0.0955	0.3793	0.0433
C2+ VOC:	0.3104	0.0709	0.2816	0.0321
C3+ VOC:	0.2352	0.0537	0.2133	0.0244

Possible Recovery Information:

Vapor:	0.5691 (mscfd)	16.1149 (m^3/d)
HC Vapor:	0.5626 (mscfd)	15.9314 (m^3/d)

Oil Compositions

Component	Separator Oil Mole %	Flash Oil Mole %	Sales Oil Mole %
H2S	0.0000	0.0000	0.0000
O2	0.0000	0.0000	0.0000
CO2	0.4200	0.0196	0.0196
N2	0.0800	0.0003	0.0003
C1	21.2000	0.3016	0.3016
C2	8.2900	0.7821	0.7821
C3	8.5400	2.8139	2.8139
i-C4	2.3000	1.6057	1.6057
n-C4	5.8400	5.1045	5.1045
i-C5	3.3500	4.3596	4.3596
n-C5	4.0400	5.6929	5.6929
HEXANES	3.4200	5.6018	5.6018
HEPTANES	9.1200	15.6619	15.6619
OCTANES	10.0900	17.5819	17.5819
NONANES	4.1700	7.2946	7.2946
BENZENE	0.4000	0.6691	0.6691
TOLUENE	1.6800	2.9105	2.9105
E-BENZENE	0.1600	0.2794	0.2794
XYLENE	1.0000	1.7473	1.7473
n-C6	3.3100	5.5121	5.5121
224Trimeth	0.0000	0.0000	0.0000
C10+	12.5900	22.0612	22.0612
Stream Mole Fraction	1.0000	0.5707	0.5707
Molecular Weight (lb/lbmole)	87.6640	130.3022	130.3022
Bubble Point @ 100F (psia)	853.7997	27.2382	27.2382
RVP @ 100F (psia)	1254.5104	101.1520	101.1520
Specific Gravity @ 100F	0.6553	0.7111	0.7111

Gas Compositions

Component	Flash Gas Mole %	W&S Gas Mole %	Total Gas Mole %
H2S	0.0000	0.0000	0.0000
O2	0.0000	0.0000	0.0000
CO2	0.9522	0.0000	0.9522
N2	0.1860	0.0000	0.1860
C1	48.9802	0.0000	48.9802
C2	18.2703	0.0000	18.2703
C3	16.1517	0.0000	16.1517
i-C4	3.2230	0.0000	3.2230
n-C4	6.8177	0.0000	6.8177
i-C5	2.0079	0.0000	2.0079
n-C5	1.8428	0.0000	1.8428

HEXANES	0.5197	0.0000	0.5197
HEPTANES	0.4239	0.0000	0.4239
OCTANES	0.1310	0.0000	0.1310
NONANES	0.0165	0.0000	0.0165
BENZENE	0.0422	0.0000	0.0422
TOLUENE	0.0444	0.0000	0.0444
E-BENZENE	0.0012	0.0000	0.0012
XYLENE	0.0066	0.0000	0.0066
n-C6	0.3828	0.0000	0.3828
224Trimeth	0.0000	0.0000	0.0000
C10+	0.0000	0.0000	0.0000
Stream Mole Fraction	0.4293	0.0000	0.4293
Molecular Weight (lb/lbmole)	30.9852	0.0000	30.9852
Heating Value (BTU/scf)	1784.1680	0.0000	1784.1680
Gas Gravity (MW Gas/MW Air)	1.0696	0.0000	1.0696

Emissions Summary

UNCONTROLLED EMISSIONS

Component	Emissions (tons/yr)	Emissions (lb/hr)	Emissions (tonnes/yr)	Emissions (kg/hr)
H2S	0.0	0.0	0.0	0.0
O2	0.0	0.0	0.0	0.0
CO2	0.1	0.0	0.1	0.0
N2	0.0	0.0	0.0	0.0
C1	2.2	0.5	2.0	0.2
C2	1.5	0.3	1.4	0.2
C3	2.0	0.4	1.8	0.2
i-C4	0.5	0.1	0.5	0.1
n-C4	1.1	0.2	1.0	0.1
i-C5	0.4	0.1	0.4	0.0
n-C5	0.4	0.1	0.3	0.0
HEXANES	0.1	0.0	0.1	0.0
HEPTANES	0.1	0.0	0.1	0.0
OCTANES	0.0	0.0	0.0	0.0
NONANES	0.0	0.0	0.0	0.0
BENZENE	0.0	0.0	0.0	0.0
TOLUENE	0.0	0.0	0.0	0.0
E-BENZENE	0.0	0.0	0.0	0.0
XYLENE	0.0	0.0	0.0	0.0
n-C6	0.1	0.0	0.1	0.0
224Trimeth	0.0	0.0	0.0	0.0
C10+	0.0	0.0	0.0	0.0

CONTROLLED EMISSIONS

Control Efficiency = 95.0 %

Component	Emissions (tons/yr)	Emissions (lb/hr)	Emissions (tonnes/yr)	Emissions (kg/hr)
H2S	0.0	0.0	0.0	0.0
O2	0.0	0.0	0.0	0.0
CO2	0.0	0.0	0.0	0.0
N2	0.0	0.0	0.0	0.0
C1	0.1	0.0	0.1	0.0
C2	0.1	0.0	0.1	0.0

C3	0.1	0.0	0.1	0.0
i-C4	0.0	0.0	0.0	0.0
n-C4	0.1	0.0	0.0	0.0
i-C5	0.0	0.0	0.0	0.0
n-C5	0.0	0.0	0.0	0.0
HEXANES	0.0	0.0	0.0	0.0
HEPTANES	0.0	0.0	0.0	0.0
OCTANES	0.0	0.0	0.0	0.0
NONANES	0.0	0.0	0.0	0.0
BENZENE	0.0	0.0	0.0	0.0
TOLUENE	0.0	0.0	0.0	0.0
E-BENZENE	0.0	0.0	0.0	0.0
XYLENE	0.0	0.0	0.0	0.0
n-C6	0.0	0.0	0.0	0.0
224Trimeth	0.0	0.0	0.0	0.0
C10+	0.0	0.0	0.0	0.0

TRANSWESTERN PIPELINE COMPANY, LLC
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FLAGSTAFF COMPRESSOR STATION

Table 6-7. Truck Loading Emissions

ID	PRODUCT	MOL WT (lb/lb-mol)	TEMP. (deg F)	VAPOR PRESSURE (psia)	SAT. FACTOR	THROUGHPUT	LOADING EMISSIONS
LOAD	(Annual) CONDENSATE	69	47.9	2.27	0.60	(gallons/year) 15,330	(ton/yr) 0.018
LOAD	(Maximum Hourly) CONDENSATE	69	40.5	2.66	0.60	(gallons/hour) 8,400	(lb/hr) 23.08

Note:
Hourly loading emissions are estimated based on loading one 200-barrel (8,400-gallon) tanker truck in one hour, which is a conservative estimate.

Loading emissions are expressed as:

$$L = 12.46 \frac{SPM}{T}$$

This emissions equation is Equation (1) of AP-42, Section 5.2-2.
where,

L = loading loss pounds per 1,000 gallons of liquid loaded
S = saturation factor for submerged loading, dedicated normal service
P = true vapor pressure of liquid loaded, psia, taken from TANKS 4.09d output
M= molecular weight of vapors, lb/lb-mole
T = temperature of bulk liquid loaded, taken from TANKS 4.09d output, where degrees R = deg F + 459.67 deg F.

TRANSWESTERN PIPELINE COMPANY, LLC
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FLAGSTAFF COMPRESSOR STATION

Table 6-8. Piping Component Fugitive Emission Calculations

ID: FUG

COMPONENT	COUNT	OIL & GAS PRODUCTION FACTORS (lb/hr/comp)	HOURS	PERCENT VOC *1	EMISSIONS ANNUAL (lb/yr)	EMISSIONS ANNUAL (tn/yr)	EMISSIONS HOURLY (lb/hr)
VALVES:							
GAS/VAPOR	20	0.00992	8760	10.00%	173.80	0.09	0.020
LIGHT OIL	22	0.005510	8760	100.0%	1061.89	0.53	0.12
PUMP SEALS:							
LIGHT OIL	4	0.02866	8760	100.0%	1004.25	0.50	0.11
FLANGES:							
GAS/VAPOR	24	0.00086	8760	10.00%	18.08	0.01	0.002
LIGHT OIL	24	0.000243	8760	100.0%	51.09	0.03	0.006
HEAVY OIL	24	0.00000086	8760	100.0%	0.18	0.0001	0.00002
COMPRESSORS:							
	3	0.0194	8760	10.00%	50.98	0.03	0.006
RELIEF VALVES:	14	0.0194	8760	100.00%	2379.22	1.19	0.27
SAMPLE CONNECTIONS:		0.00044		100.0%			
			TOTAL VOC			**2.37**	**0.54**

*1. VOC Emissions do not include methane or ethane. Percent VOC for gas service is estimated.

2. Valve count is estimated.

3. Emission factors are taken from Table 2-4, p. 2-15, of EPA-453/R-95-017, *Protocol for Equipment Leak Emission Estimates*.

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Table 6-9. Greenhouse Gas Emission Calculations

Methodology: **40 CFR Part 98, Subpart C**

	CO2 (kg/MMBtu)	Methane (kg/MMBtu)	N2O (kg/MMBtu)
Emission Factor	53.02	1.00E-03	1.00E-04
Global Warming Potential	1	25	298

INPUT DATA

Stack ID	Source Description	Engine Rating (hp)	Potential Annual Runtime (hr/yr)	Fuel Heating Value (Btu/scf)	Maximum Fuel Use (Btu/hp-hr)	Maximum Hourly Fuel Use (scf/hr)	Potential Fuel Use (MMscf/yr)	Potential Fuel Use (MMBtu/yr)
204	GE LM2500	37,270	8,760	1,028	9,451	342,644.72	3,001.57	3,085,612
223/224	Caterpillar 3508	526	9,000	1,028	8,261	4,226.85	38.04	39,107

CALCULATIONS

Stack ID	Source Description	CO2 (tpy)	Methane (tpy)	N2O (tpy)	CO2 (MT/yr)	Methane (MT/yr)	N2O (MT/yr)	CO2e (MT/yr)
204	GE LM2500	180,336.96	3.401	0.340	163,599.13	3.086	0.309	163,768
223/224	Caterpillar 3508	2,285.58	0.043	0.004	2,073.44	0.039	0.004	2,076
	Total (tpy)	**182,623**	**3.444**	**0.344**	**165,673**	**3.125**	**0.312**	N/A
	Total CO2e (tpy)	**182,623**	**86.1**	**102.6**	**165,673**	**78.12**	**93.12**	**165,844**

TOTAL CO2e (tpy)	**182,811**
TOTAL CO2e (MT/yr)	**165,844**

Notes:
kg - kilogram
Btu - British thermal unit
MM - million
hp - horsepower
hr/yr - hours per year
Btu - British thermal unit
scf - standard cubic foot
tpy - tons per year
MT/yr - metric tons per year
CO2 - carbon dioxide
N2O - nitrous oxide
CO2e - carbon dioxide equivalent

SECTION 7 – Information Used to Estimate Emissions

Table 3.1-2a. EMISSION FACTORS FOR CRITERIA POLLUTANTS AND GREENHOUSE GASES FROM STATIONARY GAS TURBINES

Pollutant	Emission Factors[a] - Uncontrolled			
	Natural Gas-Fired Turbines[b]		Distillate Oil-Fired Turbines[d]	
	(lb/MMBtu)[c] (Fuel Input)	Emission Factor Rating	(lb/MMBtu)[e] (Fuel Input)	Emission Factor Rating
CO_2[f]	110	A	157	A
N_2O	0.003[g]	E	ND	NA
Lead	ND	NA	1.4 E-05	C
SO_2	0.94S[h]	B	1.01S[h]	B
Methane	8.6 E-03	C	ND	NA
VOC	2.1 E-03	D	4.1 E-04[j]	E
TOC[k]	1.1 E-02	B	4.0 E-03[l]	C
PM (condensible)	4.7 E-03[l]	C	7.2 E-03[l]	C
PM (filterable)	1.9 E-03[l]	C	4.3 E-03[l]	C
PM (total)	6.6 E-03[l]	C	1.2 E-02[l]	C

[a] Factors are derived from units operating at high loads (≥80 percent load) only. For information on units operating at other loads, consult the background report for this chapter (Reference 16), available at "www.epa.gov/ttn/chief". ND = No Data, NA = Not Applicable.

[b] SCCs for natural gas-fired turbines include 2-01-002-01, 2-02-002-01 & 03, and 2-03-002-02 & 03.

[c] Emission factors based on an average natural gas heating value (HHV) of 1020 Btu/scf at 60°F. To convert from (lb/MMBtu) to (lb/10^6 scf), multiply by 1020. Similarly, these emission factors can be converted to other natural gas heating values.

[d] SCCs for distillate oil-fired turbines are 2-01-001-01, 2-02-001-01, 2-02-001-03, and 2-03-001-02.

[e] Emission factors based on an average distillate oil heating value of 139 MMBtu/10^3 gallons. To convert from (lb/MMBtu) to (lb/10^3 gallons), multiply by 139.

[f] Based on 99.5% conversion of fuel carbon to CO_2 for natural gas and 99% conversion of fuel carbon to CO_2 for distillate oil. CO_2 (Natural Gas) [lb/MMBtu] = (0.0036 scf/Btu)(%CON)(C)(D), where %CON = weight percent conversion of fuel carbon to CO_2, C = carbon content of fuel by weight, and D = density of fuel. For natural gas, C is assumed at 75%, and D is assumed at 4.1 E+04 lb/10^6scf. For distillate oil, CO_2 (Distillate Oil) [lb/MMBtu] = (26.4 gal/MMBtu) (%CON)(C)(D), where C is assumed at 87%, and the D is assumed at 6.9 lb/gallon.

[g] Emission factor is carried over from the previous revision to AP-42 (Supplement B, October 1996) and is based on limited source tests on a single turbine with water-steam injection (Reference 5).

[h] All sulfur in the fuel is assumed to be converted to SO_2. S = percent sulfur in fuel. Example, if sulfur content in the fuel is 3.4 percent, then S = 3.4. If S is not available, use 3.4 E-03 lb/MMBtu for natural gas turbines, and 3.3 E-02 lb/MMBtu for distillate oil turbines (the equations are more accurate).

[j] VOC emissions are assumed equal to the sum of organic emissions.

[k] Pollutant referenced as THC in the gathered emission tests. It is assumed as TOC, because it is based on EPA Test Method 25A.

[l] Emission factors are based on combustion turbines using water-steam injection.

Table 3.1-3. EMISSION FACTORS FOR HAZARDOUS AIR POLLUTANTS FROM NATURAL GAS-FIRED STATIONARY GAS TURBINES[a]

Emission Factors[b] - Uncontrolled		
Pollutant	Emission Factor (lb/MMBtu)[c]	Emission Factor Rating
1,3-Butadiene[d]	< 4.3 E-07	D
Acetaldehyde	4.0 E-05	C
Acrolein	6.4 E-06	C
Benzene[e]	1.2 E-05	A
Ethylbenzene	3.2 E-05	C
Formaldehyde[f]	7.1 E-04	A
Naphthalene	1.3 E-06	C
PAH	2.2 E-06	C
Propylene Oxide[d]	< 2.9 E-05	D
Toluene	1.3 E-04	C
Xylenes	6.4 E-05	C

[a] SCC for natural gas-fired turbines include 2-01-002-01, 2-02-002-01, 2-02-002-03, 2-03-002-02, and 2-03-002-03. Hazardous Air Pollutants as defined in Section 112 (b) of the *Clean Air Act*.

[b] Factors are derived from units operating at high loads (≥80 percent load) only. For information on units operating at other loads, consult the background report for this chapter (Reference 16), available at "www.epa.gov/ttn/chief".

[c] Emission factors based on an average natural gas heating value (HHV) of 1020 Btu/scf at 60°F. To convert from (lb/MMBtu) to (lb/10^6 scf), multiply by 1020. These emission factors can be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this heating value.

[d] Compound was not detected. The presented emission value is based on one-half of the detection limit.

[e] Benzene with SCONOX catalyst is 9.1 E-07, rating of D.

[f] Formaldehyde with SCONOX catalyst is 2.0 E-05, rating of D.

(2)

Generator Data, March 21, 2001
G3508

```
-GKGE06                TMI - ENGINE AND COMP PERF                  DATE: 03/20/01
08 - GEN SET ENGINE PERFORMANCE  TURBO QTY:                        TIME: 16:18:30
G3508      TA SC FUEL: NAT GAS    FUEL PR:  25 PSI  CARB:  IMPCO  C/R:  9.0:1
 370.0 EKW 60 HZ 1200 RPM NOX LVL: STD          IGN: EIS      JW TEMP:DEG F 210
DM5205-00  ELEK A/F CONT: NO   CAM TYPE: STD  PISTON:        A/C TEMP:DEG F 129
RATING TYPE: CONTINUOUS                                     EFF S/N:
INFO CODE 05 - EMISSIONS DATA  * * * * * RATED SPEED * * * * * * * * * * * * *
"NOT TO EXCEED DATA"
```

GEN PWR EKW	% LOAD	ENG PWR BHP	NOX (AS NO2) * * *	CO * * *	TOTAL HC LB/HR	NON-METH HC * * * *	CO2 *TNS/HR	O2 (DRY) IN EXH (VOL) %	LAMBDA
370.0	100	525.7	24.90	1.76	1.42	.21	.3	2.00	1.13
277.5	75	394.3	17.48	1.52	1.77	.27	.2	2.00	1.09
185.0	50	262.8	10.43	.99	1.06	.16	.1	1.55	1.06

Natural Gas

```
NEXT TRAN: INFO CODE ( 05 )  UNIT TYPE ( E )
OTHER METRIC DISPLAYS:  MG/NM3 (   )  PPM (   )  G/HP-HR (   )  G/GJ (   )
HLP-F1 ACF-F3 PGM-F4 SEL-F5                          IDX-F9
```

```
-GKGE07                TMI - ENGINE AND COMP PERF                  DATE: 03/20/01
08 - GEN SET ENGINE PERFORMANCE  TURBO QTY:                        TIME: 16:19:47
G3508      TA SC FUEL: NAT GAS    FUEL PR:  25 PSI  CARB:  IMPCO  C/R:  9.0:1
 370.0 EKW 60 HZ 1200 RPM NOX LVL: STD          IGN: EIS      JW TEMP:DEG F 210
DM5205-00  ELEK A/F CONT: NO   CAM TYPE: STD  PISTON:        A/C TEMP:DEG F 129
RATING TYPE: CONTINUOUS                                     EFF S/N:
INFO CODE 05 - EMISSIONS DATA  * * * * *  RATED CONDITIONS  * * * * * * * * * *
   "NOMINAL DATA"

WET EXHAUST MASS .....                                      3977 LB/HR
WET EXHAUST FLOW (  862 DEG F STACK TEMP ) .....            2313 CFM
WET EXHAUST FLOW RATE ( 32 DEG F AND 30.00 IN HG ) ...       925 SCFM
DRY EXHAUST FLOW RATE ( 32 DEG F AND 30.00 IN HG ) ...       806 SCFM
FUEL FLOW RATE        ( 32 DEG F AND 30.00 IN HG ) ...        71 SCFM

PRESS <ENTER> FOR ADDITIONAL DATA

    NEXT TRAN: INFO CODE ( 06 )  UNIT TYPE ( E )
HLP-F1 ACF-F3 PGM-F4 SEL-F5                          IDX-F9
```

Table 3.2-3. UNCONTROLLED EMISSION FACTORS FOR 4-STROKE RICH-BURN ENGINES[a]
(SCC 2-02-002-53)

Pollutant	Emission Factor (lb/MMBtu)[b] (fuel input)	Emission Factor Rating
Criteria Pollutants and Greenhouse Gases		
NO_x[c] 90 - 105% Load	2.21 E+00	A
NO_x[c] <90% Load	2.27 E+00	C
CO[c] 90 - 105% Load	3.72 E+00	A
CO[c] <90% Load	3.51 E+00	C
CO_2[d]	1.10 E+02	A
SO_2[e]	5.88 E-04	A
TOC[f]	3.58 E-01	C
Methane[g]	2.30 E-01	C
VOC[h]	2.96 E-02	C
PM10 (filterable)[i,j]	9.50 E-03	E
PM2.5 (filterable)[j]	9.50 E-03	E
PM Condensable[k]	9.91 E-03	E
Trace Organic Compounds		
1,1,2,2-Tetrachloroethane[l]	2.53 E-05	C
1,1,2-Trichloroethane[l]	<1.53 E-05	E
1,1-Dichloroethane	<1.13 E-05	E
1,2-Dichloroethane	<1.13 E-05	E
1,2-Dichloropropane	<1.30 E-05	E
1,3-Butadiene[l]	6.63 E-04	D
1,3-Dichloropropene[l]	<1.27 E-05	E
Acetaldehyde[l,m]	2.79 E-03	C
Acrolein[l,m]	2.63 E-03	C
Benzene[l]	1.58 E-03	B
Butyr/isobutyraldehyde	4.86 E-05	D
Carbon Tetrachloride[l]	<1.77 E-05	E

0.00950
+0.00991
0.01941
(Total PM Emission Factor)

Table 3.2-3. UNCONTROLLED EMISSION FACTORS FOR 4-STROKE RICH-BURN ENGINES
(Concluded)

Pollutant	Emission Factor (lb/MMBtu)[b] (fuel input)	Emission Factor Rating
Chlorobenzene[l]	<1.29 E-05	E
Chloroform[l]	<1.37 E-05	E
Ethane[n]	7.04 E-02	C
Ethylbenzene[l]	<2.48 E-05	E
Ethylene Dibromide[l]	<2.13 E-05	E
Formaldehyde[l,m]	2.05 E-02	A
Methanol[l]	3.06 E-03	D
Methylene Chloride[l]	4.12 E-05	C
Naphthalene[l]	<9.71 E-05	E
PAH[l]	1.41 E-04	D
Styrene[l]	<1.19 E-05	E
Toluene[l]	5.58 E-04	A
Vinyl Chloride[l]	<7.18 E-06	E
Xylene[l]	1.95 E-04	A

[a] Reference 7. Factors represent uncontrolled levels. For NO_X, CO, and PM-10, "uncontrolled" means no combustion or add-on controls; however, the factor may include turbocharged units. For all other pollutants, "uncontrolled" means no oxidation control; the data set may include units with control techniques used for NOx control, such as PCC and SCR for lean burn engines, and PSC for rich burn engines. Factors are based on large population of engines. Factors are for engines at all loads, except as indicated. SCC = Source Classification Code. TOC = Total Organic Compounds. PM10 = Particulate Matter ≤ 10 microns (μm) aerodynamic diameter. A "<" sign in front of a factor means that the corresponding emission factor is based on one-half of the method detection limit.

[b] Emission factors were calculated in units of (lb/MMBtu) based on procedures in EPA Method 19. To convert from (lb/MMBtu) to (lb/10^6 scf), multiply by the heat content of the fuel. If the heat content is not available, use 1020 Btu/scf. To convert from (lb/MMBtu) to (lb/hp-hr) use the following equation:

$$\text{lb/hp-hr} = (\text{lb/MMBtu})(\text{heat input, MMBtu/hr})(1/\text{operating HP, 1/hp})$$

[c] Emission tests with unreported load conditions were not included in the data set.

[d] Based on 99.5% conversion of the fuel carbon to CO_2. CO_2 [lb/MMBtu] = (3.67)(%CON)(C)(D)(1/h), where %CON = percent conversion of fuel carbon to CO_2,

SECTION 8 - Regulatory Compliance Discussion

Regulatory Compliance Discussion

This section discusses the regulatory applicability of federal and state air quality rules to Flagstaff Compressor Station and identifies requirements that are applicable to the station. Table 8-1 is a compliance demonstration table that is presented to identify potentially applicable requirements, specify the station's current compliance status with each requirement, and describe how the station maintains compliance with the requirement.

As indicated in the table for the applicable requirement of 40 Code of Federal Regulations Part 63 (40 CFR 63), Subpart ZZZZ, the generator engines at Flagstaff Compressor Station are designated to be remote stationary reciprocating internal combustion engines (RICE). Therefore, these engines are required to meet the applicable requirements for remote engines under this rule. To supplement this information contained in the table for this requirement, a discussion of the engines' remote status is presented below.

To determine whether requirements specified for remote engines are applicable to the station's engines, 40 CFR 63, Subpart ZZZZ requires that an annual evaluation be conducted to assess whether the engines continue to meet the definition of remote stationary RICE given in 40 CFR §63.6675. Transwestern conducts such an evaluation on an annual basis. The evaluation of the "remote" status of the engines considers the number of buildings intended for human occupancy within 220 yards (200 meters) on either side of the centerline of each 1-mile length of pipeline around each engine. For each engine, the number of such buildings is less than 10 and there are no buildings with four or more stories within any 1-mile segment of pipeline. In addition, no portion of any pipeline segment lies within 100 yards of either a building or a small, well-defined outside area that is occupied by 20 or more persons on at least 5 days per week for 10 weeks in any 12-month period. Therefore, for the purpose of determining applicable requirements, each engine was considered to be a remote stationary RICE as of the initial compliance date of October 19, 2013, and continues to be considered remote.

As an aid in supporting this evaluation, Figure 8-1 is an aerial photo that shows the location of Flagstaff Compressor Station and its surrounding area. The pipeline, which is underground, runs in a general east-west orientation through the southern portion of the station. As shown in the photo, based on the location of the closest buildings to the pipeline, there are no buildings within 220 yards (200 meters) of the pipeline along any one-mile segment on either side of the compressor station. (Note that this photo doesn't show the entire extent of the one-mile distance on each side of the station, but is representative of the entire extent; the annual evaluations conducted for the station assess the entire one-mile length.) Thus, this photo supports the conclusion that the engines at the station meet the definition of remote stationary RICE.

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Table 8-1. Regulatory Applicability and Compliance Demonstration

Applicable Requirement	Description	In Compliance?	Compliance Demonstration
R18-2-602	Open Burning	Yes	The Compressor Station personnel do not conduct open burning outdoors.
R18-2-604	Open Areas	Yes	Personnel drive vehicles at moderate speeds on unpaved surfaces and areas.
R18-2-605	Roadways	Yes	The roadways at the compressor station are all paved. Personnel drive at moderate speeds.
R18-2-719	Standards for Stationary Rotating Machinery	Yes	The generator engines are subject to and will comply with the particulate emission limitation of R18-2-719.C.1, visible emission standard of R18-2-719.E, and the reporting and record keeping requirements of R18-2-719.I and R18-2-719.J.
R18-2-802	Mobile Sources	Yes	Off-road machinery opacity is maintained below 40% opacity.
R18-2-901.40	Turbine NOx, SO2	Yes	All annual emission tests demonstrate compliance with NOx standard. All sulfur monitoring has demonstrated compliance with the sulfur dioxide limit.
R-18-11-1101.47	Natural Gas NESHAP	N.A.	The affected unit in this NESHAP is a glycol dehydrator. This station does not have a glycol dehydrator; therefore, this standard does not apply to the station.
R-18-11-1101.82	Turbine MACT	N.A.	The Compressor Station is not a major source of HAP, therefore this rule is not applicable.
40 CFR 60, Subpart GG	Turbine NSPS	Yes	The turbine was manufactured in year 2001; therefore, this subpart is applicable to the turbine. An annual stack test is conducted to demonstrate compliance with emission limits.
40 CFR 60, Subpart JJJJ	Internal Combustion Engine NSPS	N.A.	All engines used at the station were manufactured prior to year 2001; therefore, they are not new engines and not subject to this subpart. This subpart is applicable to engines manufactured after June 12, 2006.
40 CFR 60, Subpart OOOO	Crude Oil and Natura Gas Transmission NSPS	N.A.	This subpart applies to station constructed or modified after August 23, 2011. The station was constructed well before this date and has not been modified since that date. In particular, tanks at the station (ID Nos. TK-COND1 and TK-COND2) were installed well August 23, 2011. Therefore, per §60.5365, this subpart does not apply, and Transwestern requests a permit shield relative to this subpart.
40 CFR 60, Subpart OOOOa	Crude Oil and Natural Gas Facilities NSPS	N.A.	This subpart applies to station constructed or modified after September 18, 2015. The station was constructed well before this date and has not been modified since that date. In particular, tanks at the station (ID Nos. TK-COND1 and TK-COND2) were installed well before September 15, 2015. Therefore, per §60.5365a, this subpart does not apply, and Transwestern requests a permit shield relative to this subpart.
40 CFR 63, Subpart ZZZZ	Internal Combustion Engine NESHAP	Yes	The G3508 generator engines are existing four-stroke, rich-burn engines and are subject to operating, monitoring, and record keeping requirements of this subpart per §63.6603(a) and (f) and Table 2d for remote engines. The station will comply with these requirements. Determination of the station's status as a remote location is discussed in the text for this section.

Flagstaff Compressor Station (Approximate Boundary)

Figure 8-1. 40 CFR Part 63, Subpart ZZZZ Evaluation of Engines as Remote